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**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

March 13, 2013

Jose Franco, Manager
Carlsbad Field Office
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P.O. Box 3090
Carlsbad, New Mexico 88221-3090

M. Farok Sharif, Project Manager
Nuclear Waste Partnership LLC
P.O. Box 2078
Carlsbad, New Mexico 88221-5608

**RE: FINAL DETERMINATION, CLASS 2 MODIFICATION REQUEST**
**WIPP HAZARDOUS WASTE FACILITY PERMIT**
**EPA I.D. NUMBER NM4890139088**

Dear Messrs. Franco and Sharif:

The New Mexico Environment Department (**NMED**) hereby approves with changes the permit modification request (**PMR**) to the WIPP Hazardous Waste Facility Permit as submitted to the Hazardous Waste Bureau in the following document:

- Request for Class 2 Permit Modification (Revise Waste Analysis Plan Waste Characterization Methods), Letter Dated December 12, 2012, Received December 14, 2012

This Class 2 PMR was evaluated and processed in accordance with the requirements specified in 20.4.1.900 NMAC (incorporating 40 CFR §270.42(b)). The Class 2 PMR was subject to a 60-day public comment period running from December 18, 2012 through February 18, 2013.

Pursuant to 20.4.1.900 NMAC (incorporating 40 CFR 270.42(b)(7)(i) and (ii)) NMED hereby approves this modification with changes as noted in the attached CD-ROM. It contains a redline/strikeout version of the modified permit to help rapidly identify each modification. Language deleted from the permit is ~~stricken out~~. Language added to the permit is in red.

130310

Specific language changes imposed by NMED are distinguished from language changes proposed in the modification request by yellow highlighting. It also has final versions with markings and comments removed. An electronic version of the modified permit with markings removed will also be publicly posted on the NMED WIPP Information Page at <http://www.nmenv.state.nm.us/wipp/download.html>.

For purposes of version control, please note that NMED has established the date of these modified part and attachment pages as March 13, 2013. The date of the permit modification approval is your date of receipt of this letter.

NMED is providing response to all public comments under separate cover.

If you have any questions regarding this matter, please contact Trais Kliphuis of my staff at (505) 476-6051.

Sincerely,

Thomas Skibitski

Thomas Skibitski
Acting Director
Resource Protection Division

Attachment 1 – CD with Microsoft Word copies of both redline strikeout version and changes incorporated version

cc: John Kieling, NMED HWB
Trais Kliphuis, NMED HWB
Thomas Kesterson, NMED DOE-OB/WIPP
Laurie King, EPA Region 6
Tom Peake, EPA ORIA

File: Red WIPP '13

# ATTACHMENT C

# WASTE ANALYSIS PLAN

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# ATTACHMENT C

# WASTE ANALYSIS PLAN

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# ATTACHMENT C

# WASTE ANALYSIS PLAN

## 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 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 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.

TRU mixed waste that may be stored or disposed at WIPP 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.

TRU mixed waste contains both TRU radioactive and hazardous components, as defined in Permit Section 1.5.7. 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.

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 WIPP as long as the Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**) in 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 §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 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 will be 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 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 WIPP. The characterization process for WIPP waste is presented in Figure C-2. Generator site waste characterization programs are first audited by DOE, with NMED approving the final audit report. After this, generator sites determine whether AK alone is sufficient for characterization, or whether radiography or 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; NMED determination of adequacy of the AK information is required before final approval by 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 would then prepare and submit the Waste Stream Profile Form for DOE's approval. Once the WSPF is approved, a site may ship waste to WIPP. The Permittees will perform waste confirmation prior to shipment of the waste from the generator/storage site to WIPP 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 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 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).

TRU 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.

<u>S3000 - Homogeneous Solids</u>
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.

<u>S4000 - Soils/Gravel</u>
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.

<u>S5000 - Debris Wastes</u>
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:

<u>Metals</u>

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 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. 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.

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 WIPP meets the applicable requirements of the TSDF-WAC in Part 2. The generator/storage site shall assemble the Acceptable Knowledge (**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 Attachments C1 is not required.

All waste characterization activities specified in this WAP and associated Permit Attachments shall be carried out at generator/storage sites in accordance with this WAP. 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:

[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.

- 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
- 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 visual examination (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 all information specified in Permit Attachment C4, Section C4-3d

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

All 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 all the identification of waste material parameter weights by percentage of the material in the waste stream, and determinations must be technically correct.

All 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 that shall, at a minimum, address all of the technical and procedural requirements listed above. The Permittees shall resolve comments with the generator/storage site.

If 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 all 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 on the WIPP Home Page;

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

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

If DOE provisionally approves the Determination Request, it may forward it along with all relevant information submitted with the Determination Request to NMED for an evaluation that the provisional approval made by DOE is adequate. DOE shall also provide to NMED, as a separate appendix to the Determination Request, the compilation of all comments and DOE's response to each comment. After submitting a Determination Request to NMED, the Permittees will post a link to the transmittal letter to NMED on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11. 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. 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, DOE shall not submit a Determination Request for the same waste stream at a later date. DOE shall not submit a Determination Request if a previous Determination Request is pending evaluation by NMED.

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

By July 1 of each year, the Permittees shall submit to NMED a list of waste streams the Permittees may submit for an AK Sufficiency Determination during the upcoming federal fiscal year. The Permittees will post a link to the transmittal letter to 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 DOE does not approve a Determination Request, or if NMED finds that 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, DOE provisionally approves the Determination Request and NMED finds that 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 DOE or the generator/storage site has completed the applicable testing requirements specified in Permit Attachments C1 the generator/storage site will complete a Waste Stream Profile Form (**WSPF**) and 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 Contact-Handled or Remote-Handled 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**). DOE will approve and provide NMED with copies of the approved WSPF and accompanying CIS prior to waste stream shipment. Upon notification of DOE's approval of the WSPF, the generator/storage site may be authorized to ship waste to WIPP.

In the event the Permittees request detailed information on a waste stream, the site will provide a Waste Stream Characterization Package (Section C3-6b(2)). 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 7 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 WIPP.

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

C-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 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 Wastes. 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 WIPP as long as the TSDF-WAC are met. The Permittees will require sites to perform characterization of all 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 until a permit modification has been submitted to and approved by NMED.

## C-1c Waste Prohibited at the WIPP Facility

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

- liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable:
  - Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination
  - Internal containers with more than 60 milliliters or 3 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 7 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 that the Permittees will 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 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.

## C-1d Control of Waste Acceptance

Every waste stream shipped to WIPP shall be preceded by a WSPF (Figure C-1) and a CIS. The required WSPF information and the CIS elements are found in 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 WIPP. 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 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 for WIPP disposal. DOE will approve and submit completed WSPFs to 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 (Section C3-6b(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.

### 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. 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 WIPP.

- 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 actions.
- 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 all approved hazardous waste numbers which are acceptable at WIPP 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 C1-1.

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 §261 Subpart C)
- Determination whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §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 acceptable knowledge and may also include, as necessary, radiography and visual examination. All 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 (**AK**) is used in TRU mixed waste characterization activities in five 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 §261 Subpart C)
- To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §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 acceptable knowledge. In addition, Section C-5a(3) of this permit attachment describes the assessment of acceptable knowledge through the Audit and Surveillance Program.

## C-3b Radiography and Visual Examination

Radiography and visual examination (**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 DOE approves a Determination Request. No RH TRU mixed waste will be shipped to WIPP 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 for WIPP disposal. 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 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 acceptable knowledge 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 acceptable knowledge 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 visual examination 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 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 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:

- 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 §261 Subpart C).
  - To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §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 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 all of 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

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 QAPjP, controlled electronic databases, or procedures referenced in the QAPjP (Permit Attachment C5) and will include all of the elements required by this WAP for BDR (Permit Attachment C3).

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. 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, DOE will take appropriate action as specified in Permit Attachment C6.

C-4a(4) Data Verification

BDRs 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). NMED may request, through the Permittees, copies of any BDR, and/or the raw data validated by the generator/storage sites, to check DOE's audit of the validation process.

C-4a(5) Data Transmittal

BDRs will include the information required by 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 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 C-5a(1) for WWIS reporting requirements and the *Waste Data System User's Manual* (DOE, 2009) 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 (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.

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. TRU mixed waste

characterization records submitted to the Permittees shall be maintained in the WIPP facility operating record and be available for inspection by NMED.

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 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, all 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 WIPP. Notations will be provided to the Permittees indicating the absence of classified information. The approved generator/storage site RIDS will 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. 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 Audit and Surveillance Program (Permit Attachment C6). 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 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 CIS are present (Permit Attachment C3) and that the

waste characterization information meet acceptance criteria required for compliance with the WAP (Section C3-6b(1)).

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 WIPP. Additional audits, focusing on the results of waste characterization, will be performed at least annually. 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 (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 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 CIS for that waste stream (Section C3-6b(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 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, 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 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 all 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. 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 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. DOE 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.

C-5a(1) WWIS Description

All generator/storage sites planning to ship TRU mixed waste to WIPP will supply the required data to the WWIS. The WWIS Data Dictionary includes all of 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* (DOE, 2009).

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 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 NMED. 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 at the WIPP site, 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, and three-packs), 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.

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 all changes made to previously approved data.

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

The Permittees will 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 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 all 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 WIPP. 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 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: 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. 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.

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 NMED. Waste stream approval will not be reinstated until the generator/storage site demonstrates all corrective actions have been implemented and the generator/storage site waste characterization program is reassessed by DOE.

### 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 all 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.

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. 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 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 all 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 all 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 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.

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 each container holding TRU mixed waste against the WWIS database after opening the Shipping Package.

The WWIS links the bar-coded identification numbers of all containers in a specific waste shipment to the waste assembly (for 7-packs, 4-packs, 3-packs and 5-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 7-pack, 4-pack, or 3-pack) 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 or shipping cask closure date
- Package (container or canister) receipt date
- Overpack identification number (if appropriate)
- Package (container or canister) emplacement date
- Package (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 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 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 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 NMED in writing. Notifications to 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 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

TRU mixed waste designated by the Secretary of Energy for disposal at WIPP 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 WIPP 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 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 radiological exposure. If all of 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 WIPP 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 all records associated with waste shipment screening determinations.

## C-7 Records Management and Reporting

As part of the WIPP facility's operating record, data and documents associated with waste characterization and waste confirmation are managed in accordance with standard records management practices.

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 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 records inventory and disposition schedule.

The following records will be maintained for waste characterization and waste confirmation purposes as part of the WIPP facility 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
- CARs 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 all 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 WIPP facility operating record are managed in accordance with the following guidelines:

<u>C-7a General Requirements</u>

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) to NMED that includes information on actual volume and waste descriptions received for disposal during the time period covered by the report.

## C-9 List of References

U.S. Department of Energy (DOE), 2009, "Waste Data System User's Manual", DOE/WIPP 09-3427, 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 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.

# TABLES

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**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<br>• Salt waste<br>• Solidified organics | Physical waste form | Acceptable knowledge, radiography and/or visual examination | • Determine waste matrix<br>• 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)<br>• Lead/cadmium waste<br>• Inorganic nonmetal waste<br>• Combustible waste<br>• Graphite waste<br>• Heterogeneous debris waste<br>• Composite filter waste | Hazardous constituents<br>• Listed<br>• 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<br>• Field sampling data forms<br>• Field and laboratory chain-of-custody forms<br>• Test facility and laboratory batch data reports<br>• Waste Stream Characterization Package<br>• Sampling Plans<br>• Data reduction, validation, and reporting documentation<br>• Acceptable knowledge documentation<br>• Waste Stream Profile Form and Characterization Information Summary |
| Non-Permanent Records<br>• Nonconformance documentation<br>• Variance documentation<br>• Assessment documentation<br>• Gas canister tags<br>• Methods performance documentation<br>• Performance Demonstration Program documentation<br>• Sampling equipment certifications<br>• Calculations and related software documentation<br>• Training/qualification documentation<br>• QAPjPs (generator/storage sites) documentation (all revisions)<br>• Calibration documentation<br>• Analytical raw data<br>• Procurement documentation<br>• QA procedures (all revisions)<br>• Technical implementing procedures (all revisions)<br>• Audio/video recording (radiography, visual, etc.) |

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

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

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

[f] Required for 7-packs of 55-gal drums, 4-packs of 85-gal drums, or 3-packs of 100-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.

**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 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.

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# FIGURES

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WASTE STREAM PROFILE FORM

Waste Stream Profile Number: _____
Generator Site Name: _____ Technical Contract: _____
Generator Site EPA ID: _____ Technical Contact Phone Number: _____
Date of audit report approval 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 one)
  - ☐ 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 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)**

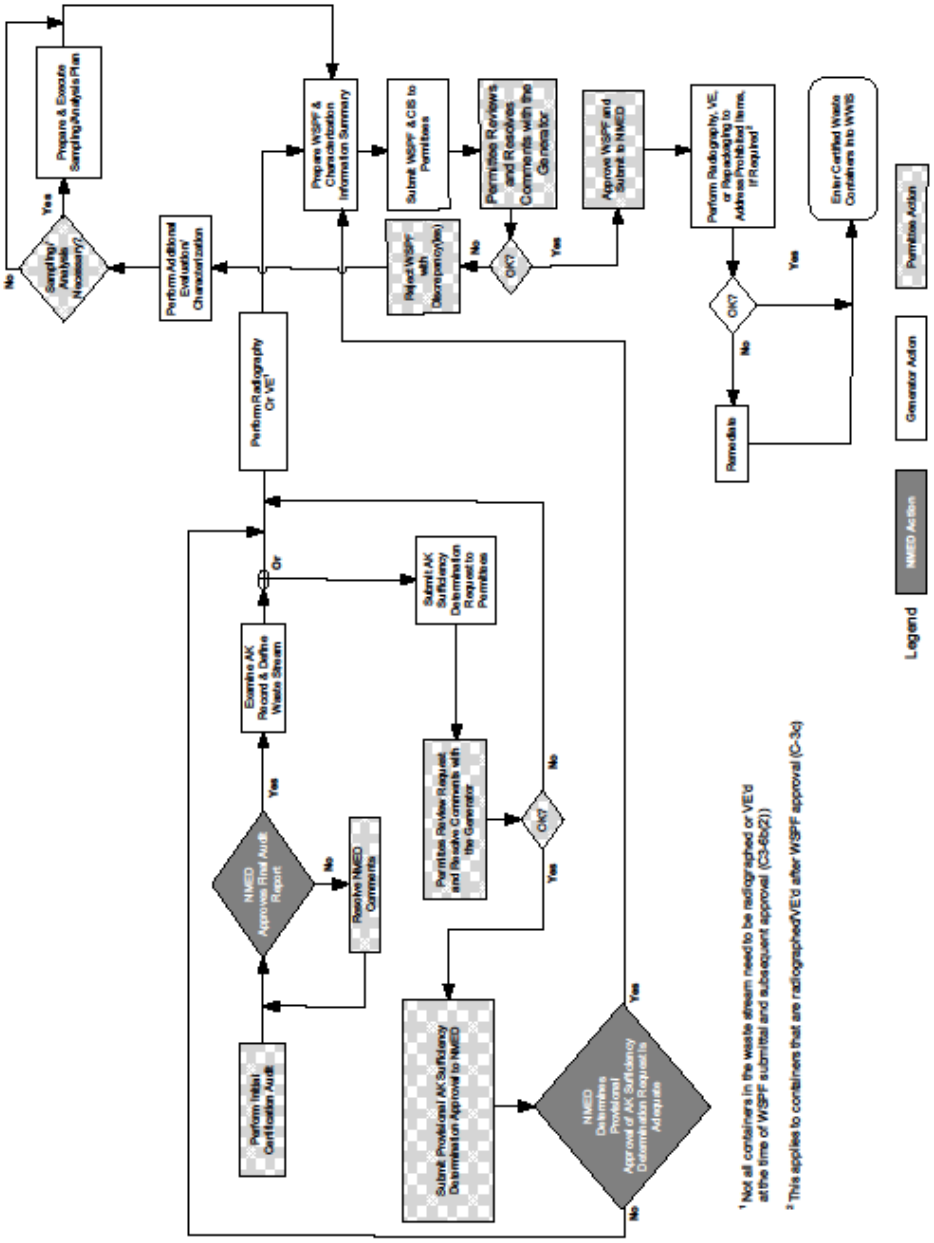


Figure C-2
Waste Characterization Process

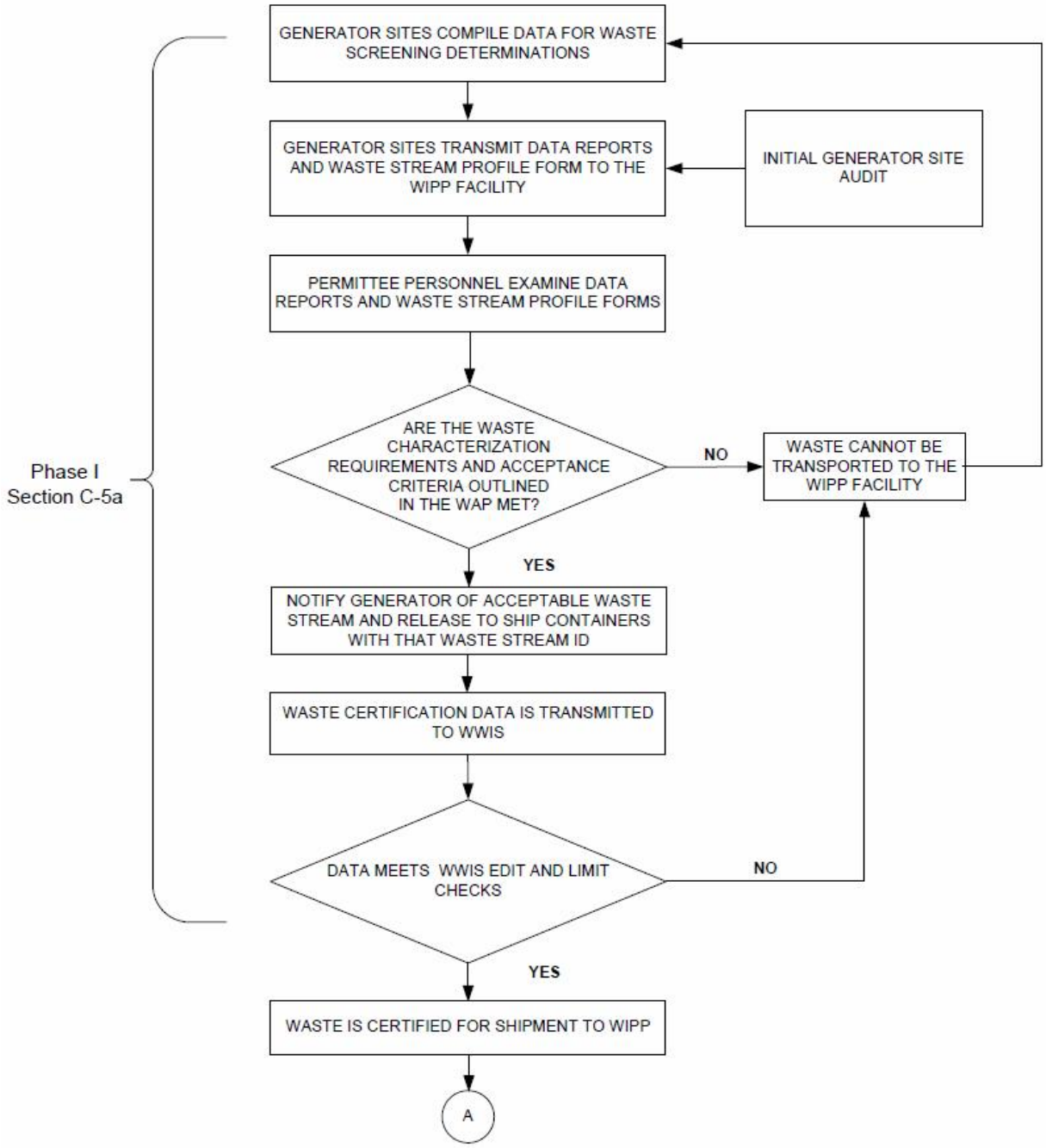


**Figure C-3**
**TRU Mixed Waste Screening and Verification**

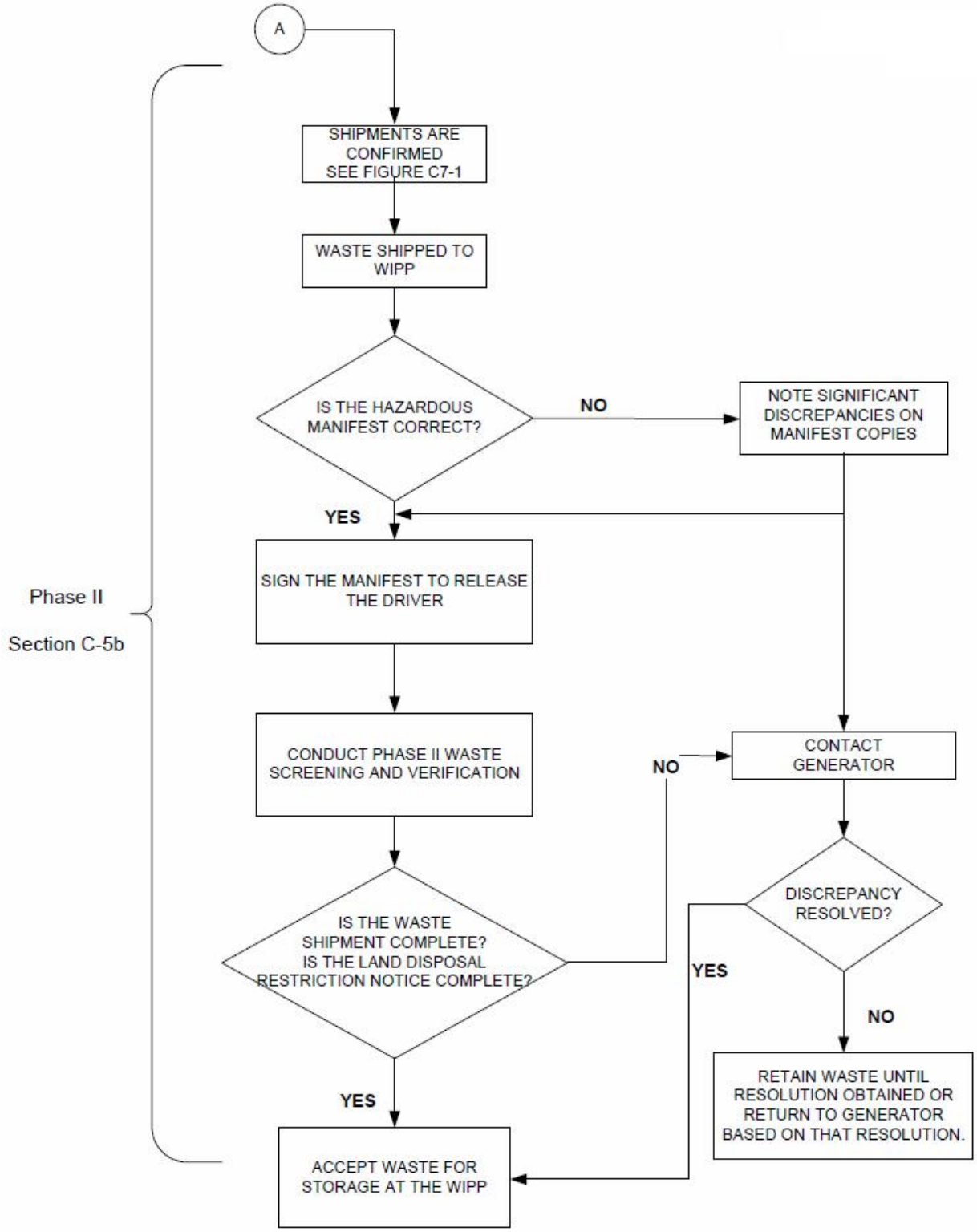


**Figure C-3**
**TRU Mixed Waste Screening and Verification (Continued)**

# ATTACHMENT C

# WASTE ANALYSIS PLAN

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# ATTACHMENT C

# WASTE ANALYSIS PLAN

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# ATTACHMENT C

# WASTE ANALYSIS PLAN

## 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 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~~,~~ and details of planned waste ~~sampling and~~ 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.

TRU mixed waste that may be stored or disposed at WIPP 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.

TRU mixed waste contains both TRU radioactive and hazardous components, as defined in Permit Section 1.5.7. 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.

The hazardous components of the TRU mixed waste to be managed at the WIPP facility are designated in Table C-~~9~~5. 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 Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**) in 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-~~9~~ 5 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 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 will be 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 requirements for newly generated and retrievably stored TRU mixed wastes differ, as discussed in Sections C-3d(1) and C-3d(2).~~

Waste characterization is defined in 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 WIPP. The characterization process for WIPP waste is presented in Figure C-2. Generator site waste characterization programs are first audited by DOE, with NMED approving the final audit report. After this, generator sites determine whether AK alone is sufficient for characterization, or whether ~~a sampling and analysis program~~ radiography or 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; NMED determination of adequacy of the AK information is required before final approval by DOE. If the ~~sampling and analysis~~radiography or VE route is chosen, sites proceed to ~~sample and analyze waste~~perform radiograpy or VE in conjunction with AK and in accordance with this WAP. Once an AK Sufficiency Determination is obtained, or when required ~~sampling and analysis~~radiography or VE data are obtained, sites would then prepare and submit the Waste Stream Profile Form for DOE's approval. Once the WSPF is approved, a site may ship waste to WIPP. The Permittees will perform waste confirmation prior to shipment of the waste from the generator/storage site to WIPP 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 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 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).

TRU 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 ~~separately~~ 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 Wastes
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.

~~If a waste does not include at least 50 percent of any given Summary Category Group 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 C-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 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. 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.

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 WIPP meets the applicable requirements of the TSDF-WAC in Part 2. The generator/storage site shall assemble the Acceptable Knowledge (**AK**) information into an auditable record[1] for the

[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.

waste stream as described in Permit Attachment C4. For those waste streams with an approved AK Sufficiency Determination (see below), ~~sampling and analysis~~radiography or VE per the methods described in Permit Attachments C1 ~~and C2 are~~is not required.

All waste characterization activities specified in this WAP and associated Permit Attachments shall be carried out at generator/storage sites ~~and DOE approved laboratories~~ in accordance with this WAP. 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~~, although not all these techniques will be used on each container~~, as discussed in Section C-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
- ~~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 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 visual examination (VE) based on AK~~meet all or part of the waste characterization requirements~~. The contents of the Determination Request are specified in Permit Attachment C4, Section C4-3d. ~~The Determination Request may take one of the following forms:~~

~~Scenario 1 Radiography or visual examination (**VE**) of the waste stream is not required, and chemical sampling and analysis is not required;~~

~~Scenario 2 Radiography or VE of the waste stream is not required, but chemical sampling and analysis of a representative sample of the waste stream is required; or~~

~~Scenario 3 Chemical sampling and analysis is not required, but radiography or VE of 100% of the containers in the waste stream is required.~~

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 all information specified in Permit Attachment C4, Section C4-3d

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

All 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 all the identification of waste material parameter weights by percentage of the material in the waste stream, and determinations must be technically correct.

All 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 that shall, at a minimum, address all of the technical and procedural requirements listed above. The Permittees shall resolve comments with the generator/storage site~~, and the Permittees may change the scope of the Determination Request to one of the three scenarios~~.

If 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 all 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 on the WIPP Home Page;
4. E-mail notification as specified in Permit Section 1.11.

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

If DOE provisionally approves the Determination Request, it may forward it along with all relevant information submitted with the Determination Request to NMED for an evaluation that the provisional approval made by DOE is adequate. DOE shall also provide to NMED, as a separate appendix to the Determination Request, the compilation of all comments and DOE's response to each comment. After submitting a Determination Request to NMED, the Permittees will post a link to the transmittal letter to NMED on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11. 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. 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, DOE shall not submit a Determination Request for the same waste stream at a later date. DOE shall not submit a Determination Request if a previous Determination Request is pending evaluation by NMED.

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

By July 1 of each year, the Permittees shall submit to NMED a list of waste streams the Permittees may submit for an AK Sufficiency Determination during the upcoming federal fiscal year. The Permittees will post a link to the transmittal letter to 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 DOE does not approve a Determination Request, or if NMED finds that 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.~~ and chemical sampling and analysis on a representative sample of the waste stream using headspace gas sampling and analysis (for debris waste) or solids sampling and analysis (for homogeneous solid or soil/gravel waste) as specified in Permit Attachments C1 and C2.~~

If a generator/storage site submits a Determination Request, DOE provisionally approves the Determination Request ~~as Scenario 1,~~ and NMED finds that DOE's provisional approval is adequate, neither radiography nor VE ~~nor chemical sampling and analysis~~ of the waste stream is required.

~~If a generator/storage site submits a Determination Request, DOE provisionally approves the Determination Request as Scenario 2, and NMED finds that DOE's provisional approval is adequate, chemical sampling and analysis of a representative sample of the waste stream is required, but radiography or VE is not required.~~

~~If a generator/storage site submits a Determination Request, DOE provisionally approves the Determination Request as Scenario 3, and NMED finds that DOE's provisional approval is adequate, radiography or VE of 100% of the containers in the waste stream is required, but chemical sampling and analysis is not 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 DOE or the generator/storage site has completed the applicable ~~representative sampling and analysis~~testing requirements specified in Permit Attachments C1 ~~and C2,~~ the generator/storage site will complete a Waste Stream Profile Form (**WSPF**) and Characterization Information Summary (**CIS**). The requirements for the completion of a WSPF and a CIS are specified in Permit Attachment C3, Sections C3-~~12b~~6b(1) and C3-~~12b~~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 Contact-Handled or Remote-Handled 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**). DOE will approve and provide NMED with copies of the approved WSPF and accompanying CIS prior to waste stream shipment. Upon notification of DOE's approval of the WSPF, the generator/storage site may be authorized to ship waste to WIPP.

In the event the Permittees request detailed information on a waste stream, the site will provide a Waste Stream Characterization Package (Section C3-~~12b~~6b(2)). 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 ~~analytical~~ 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 7 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 WIPP.

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

C-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 C-~~3b~~ 3a and Permit Attachment C4.

~~All of the waste within a waste stream may not be accessible for sampling and analysis at one time. Permit Attachment C2 addresses the requirements for selecting waste containers used for characterization of waste streams as they are generated or retrieved.~~

## 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 Wastes. 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-~~9~~5. 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 Permittees will require sites to perform characterization of all 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 until a permit modification has been submitted to and approved by NMED.

## C-1c Waste Prohibited at the WIPP Facility

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

- liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable:
  - Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination
  - Internal containers with more than 60 milliliters or 3 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-~~8~~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 7 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 that the Permittees will 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 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.

## C-1d Control of Waste Acceptance

Every waste stream shipped to WIPP shall be preceded by a WSPF (Figure C-1) and a CIS. The required WSPF information and the CIS elements are found in Section C3-~~12b~~6b(1) and Section C3-~~12b~~6b(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 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 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 for WIPP disposal. DOE will approve and submit completed WSPFs to 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 (Section C3-~~12b~~6b(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.

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. 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-~~15~~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 WIPP.

- ~~Procedures used to verify packaging configurations to determine the correct drum age criteria (**DAC**) if headspace gas sampling and analysis is used to collect waste characterization information per Section C1-1a(1) of the WAP.~~

- 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 actions.
- 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 all approved hazardous waste numbers which are acceptable at WIPP are included in Table C-~~9~~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-~~4~~1.

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 §261 Subpart C)
- Determination whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart D)
- Estimation of waste material parameter weights

Table~~s~~ C-1~~, C-2, C-3 and C-4~~ provides the parameters of interest for the various constituent groupings and ~~analytical~~ 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 acceptable knowledge and may also include, as necessary, ~~headspace-gas sampling and analysis,~~ radiography~~,~~ and visual examination~~, and homogeneous waste sampling and analysis~~. All characterization activities are performed in accordance with the WAP. Table C-~~5~~1 provides a summary of the characterization requirements for TRU mixed waste.

~~C-3a Sampling and Analytical Methods~~

~~C-3a(1) Headspace Gas Sampling and Analysis~~

~~Representative headspace-gas sampling and analysis shall be used by generator/storage sites to determine the types and concentrations of VOCs in the void volume of randomly selected waste containers in order to resolve the assignment of EPA hazardous waste numbers for those debris waste streams for which an AK Sufficiency Determination Request has not been approved by DOE. In addition, VOC constituents will be compared to those assigned by acceptable knowledge, which may include an analysis of radiolytically derived VOCs. The generator/storage sites may also consider radiolysis and packaging materials when assessing the presence of hazardous constituents in the headspace-gas results, and whether radiolysis would generate wastes which exhibit the toxicity characteristic. Refer to Permit Attachment C4 for additional clarification regarding hazardous waste number assignment and headspace gas results. The methods for random selection of containers for headspace-gas sampling and analysis are specified in Permit Attachment C2. Headspace-gas sampling and analysis shall be subject to the Audit and Surveillance Program (Permit Attachment C6).~~

~~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 BDR 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 C3.~~

~~C-3a(2) Homogeneous and Soil/Gravel Waste Sampling and Analysis~~

~~Representative homogeneous and soil/gravel waste sampling and analysis shall be used by generator/storage sites to resolve the assignment of EPA hazardous waste numbers for homogeneous and soil/gravel waste streams for which an AK Sufficiency Determination Request has not been approved by DOE. Sampling of homogeneous and soil/gravel wastes shall result in the collection of a sample that is used to resolve the assignment of hazardous waste numbers. Sampling is accomplished through coring or other EPA-approved sampling, which is described in Permit Attachment C1.For those waste streams defined as Summary Category Groups S3000 or S4000 on page C-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 C2. Homogeneous and soil/gravel sampling and analysis shall be subject to the Audit and Surveillance Program (Permit Attachment C6).~~

~~Totals or TCLP analyses for 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 C-3 and C-4). 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 C2. If toxicity characteristic (**TC**) wastes are identified, these will be compared to those determined by acceptable knowledge and TC waste numbers will be revised, as warranted. Refer to Permit Attachment C4 for additional clarification regarding hazardous waste number assignment and homogeneous solid and soil/gravel analytical results.~~

~~C-3a(3) – Laboratory Qualification~~

~~DOE will ensure that generator/storage sites conduct analyses using laboratories that are qualified through participation in the Performance Demonstration Program (**PDP**) (DOE, 2003, 2005). Required QAOs are specified in Permit Attachment C3. In addition, methods and supporting performance data demonstrating QAO compliance shall be ensured by DOE during the annual certification audit of the laboratories.~~

~~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 C3.~~

C-~~3b~~3a Acceptable Knowledge

Acceptable knowledge (**AK**) is used in TRU mixed waste characterization activities in five 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 §261 Subpart C)
- To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §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 acceptable knowledge. In addition, Section C-5a(3) of this permit attachment

describes the assessment of acceptable knowledge through the Audit and Surveillance Program.

C-~~3c~~3b Radiography and Visual Examination

Radiography and visual examination (**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 DOE approves a ~~Scenario 1 or Scenario 2~~ Determination Request. No RH TRU mixed waste will be shipped to WIPP 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 ~~its~~ 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 for WIPP disposal. 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 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 acceptable knowledge 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-~~13~~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 acceptable knowledge 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 visual examination 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-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 may differ based on the waste stream and the physical form of the~~

~~waste (i.e., heterogeneous 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 C-3b discusses the use of acceptable knowledge, sampling, and analysis in more detail. Acceptable knowledge is discussed more completely in Permit Attachment C4. Every TRU mixed waste stream will be assigned hazardous waste numbers based upon acceptable knowledge, and the generator/storage sites may resolve the assignment of hazardous waste numbers using headspace gas (Summary Category Group S5000 only) and solid sampling and analysis (Summary Category Groups S3000 and S4000 only).~~

~~In the CIS for each waste stream, the generator/storage site will be required to document their methods, and the findings from those methods, for determining the physical form of the waste and the presence or absence of prohibited items for both retrievably stored and newly generated waste. Radiography and/or VE may be used to verify the physical form of retrievably stored TRU mixed waste. For newly generated waste, physical form and prohibited items may either be documented during packaging using VE or verified after packaging using radiography or VE.~~

~~For debris waste streams that do not have an AK Sufficiency Determination approved by DOE, containers selected in accordance with Permit Attachment C2 from those waste streams must be sampled and analyzed for VOCs in the headspace gas. Likewise, a statistically selected portion of homogeneous solids and soil/gravel waste streams must be sampled and analyzed for RCRA-regulated total VOCs, SVOCs, and metals when those waste streams do not have an AK Sufficiency Determination approved by DOE. Sampling and analysis methods used for waste characterization are discussed in Section C-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 numbers 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 number. 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 generator/storage site will add these TICs to the list of hazardous constituents for the waste stream (and assign additional EPA listed hazardous waste numbers, if appropriate). A permit modification will be submitted to NMED for their approval to add these constituents (and waste numbers), if necessary. For toxicity characteristic compounds and non-toxic F003 constituents, the generator/storage site may consider waste concentration when determining whether to change a hazardous waste number. Refer to Permit Attachment C3 for additional information on TIC identification.~~

~~Waste characterization solid sampling and analysis activities may differ for retrievably stored waste and newly generated waste. The waste characterization processes used by the generator/storage sites for both retrievably stored and newly generated waste streams will be evaluated during DOE's audit of the site. The typical waste characterization data collection design used by the generator/storage sites for each type of waste is described in the following sections. Table C-1 provides a summary of hazardous waste characterization requirements for all TRU mixed waste by waste characterization parameters.~~

~~Table C-5 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. Treated waste shall retain the original waste stream's listed hazardous waste number designation.~~

~~C-3d(1) – Newly Generated Waste~~

~~The RCRA-regulated constituents in newly generated wastes will typically be documented at the time of generation based on acceptable knowledge for the waste stream. Newly generated TRU mixed waste characterization typically begins with verification that processes generating the waste have operated within established written procedures. Waste containers are delineated into waste streams using acceptable knowledge. The Permittees will require that the generator/storage sites document the methods used to delineate waste streams in the acceptable knowledge record and Acceptable Knowledge Summary Report. Determination that the physical form of the waste (Summary Category Group) corresponds to the physical form of the assigned waste stream may be accomplished either using VE during packaging or by performing radiography as specified in Permit Attachment C1, Section C1-3 for retrievably stored waste. Instead of using a video/audio tape and a single operator, the VE method for newly generated waste (or repackaged retrievably stored waste) may use a second operator, who is equally trained to the requirements stipulated in Permit Attachment C1, 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 [2] will be taken as specified in Permit Attachment C3. The subsequent waste characterization activities depend on the assigned Summary Category Group, since waste within the Homogeneous Solids and Soils/Gravel Summary Category Groups may 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 (**DAC**) in accordance with Permit Attachment C1, Section C1-1, may be documented as part of the characterization information collected during the packaging of newly generated waste or repackaging of retrievably stored waste for those containers of debris waste that will undergo headspace gas sampling and analysis.~~

~~C-3d(1)(a) – Sampling of Newly Generated Homogeneous Solids and Soil/Gravel~~

~~When a Determination Request has not been approved by DOE, sampling and analysis of newly generated homogeneous solid and soil/gravel waste streams shall be conducted in accordance with the requirements specified in Permit Attachment C1, Section C1-2. The~~

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~~[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.~~

~~number of newly generated homogeneous solid and soil/gravel waste containers to be sampled will be determined using the procedure specified in Section C2-1, wherein a statistically selected portion of the waste will be sampled.~~

~~C-3d(2) Retrievably Stored Waste~~

~~All retrievably stored waste containers will first be delineated into waste streams using acceptable knowledge. The Permittees will require that the generator/storage sites document the methods used to delineate waste streams in the acceptable knowledge record and Acceptable Knowledge Summary Report. Retrievably stored waste containers may be examined using radiography or VE to determine the physical waste form (Summary Category Group), the absence of prohibited items, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000).~~

~~The headspace gas sampling method provided in Permit Attachment C1 will be used, when necessary, to resolve the assignment of EPA hazardous waste numbers to debris waste streams, as specified in Permit Attachment C4.~~

~~A statistically selected portion of retrievably stored homogeneous solids and soil/gravel wastes will be sampled and analyzed for total VOCs, SVOCs, and metals, when necessary. The sample location selection method is described in Permit Attachment C2. The sampling methods for these wastes are provided in Permit Attachment C1.~~

~~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 headspace gas sampling and waste subjected to homogeneous solids and soil/gravel sampling and analysis will be validated by the generator/storage site and by DOE during an audit (Permit Attachment C6) via examination of documentation that shows that 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.)~~

## 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 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-~~10~~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 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:

- 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 §261 Subpart C).
  - To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §261, Subpart D).
  - To estimate waste material parameter weights.
- ~~Headspace Gas Sampling and Analysis~~
  - ~~To identify VOCs and quantify the concentrations of VOC constituents in waste containers to resolve the assignment of EPA hazardous waste numbers~~
- ~~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 resolve the assignment of EPA hazardous waste numbers.~~
- 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 wate sream description as determined by AK.~~determine the physical waste form, the absence of prohibited items, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000).~~
- ~~Visual Examination~~
  - ~~To determine .the physical waste form, the absence of prohibited items, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000).~~

Reconciliation of these DQOs by the Generator/Storage Site Project Manager~~ or DOE approved laboratories~~, 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 ~~or DOE approved laboratories, as applicable,~~ shall demonstrate compliance with each QAO associated with the ~~various~~ characterization methods as presented in Permit Attachment C3. Generator/Storage Site Project Managers ~~or DOE approved laboratories, as applicable,~~ are further required to perform a reconciliation of the data with the DQOs established in this WAP. The Generator/Storage Site Project Manager ~~or DOE approved laboratories, as applicable,~~ shall conclude that all of 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~~, including a mathematical representation, where appropriate,~~ can be found in Permit Attachment C3, which describes the QAOs associated with each test method.~~ of sampling and analysis.~~

~~C-4a(3) Sample Control~~

~~The generator/storage sites and DOE approved laboratories, as applicable, 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 and DOE approved laboratories, as applicable, 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. DOE 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 C5. Details of this sample control program are provided in Permit Attachment C1 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.~~

C-4a(~~4~~3) Data Generation

BDRs, in a format approved by DOE, will be used by each generator/storage site ~~and DOE approved laboratories, as applicable,~~ for reporting waste characterization data. This format will be included in the generator/storage site ~~and DOE approved laboratories, as applicable~~, QAPjP, controlled electronic databases, or procedures referenced in the QAPjP (Permit Attachment C5) and will include all of the elements required by this WAP for BDR (Permit Attachment C3).

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. 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, DOE will take appropriate action as specified in Permit Attachment C6.

~~DOE shall perform audits of the DOE approved laboratory's programs, as implemented by the laboratory's QAPjP (See Permit Attachment C6 for a discussion of the content of the audit program). The primary functions of these audits are to review the DOE approved laboratory's adherence to the requirements of this WAP. DOE shall provide the results of each audit to NMED. If audit results indicate that a DOE approved laboratory is not in compliance with the requirements of this WAP, DOE will take appropriate action as specified in Permit Attachment C6.~~

~~DOE shall further require all DOE approved laboratories analyzing WIPP waste samples for the generator/storage sites to have established, documented QA/QC programs. DOE annually evaluates these laboratories and their QA/QC programs as part of their participation in DOE's PDP laboratory performance program. DOE's 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 DOE at the generator/storage sites and these laboratories~~

~~as specified in Permit Attachment C6. DOE's audits of the generator/storage sites will verify that the laboratories analyzing the sites' 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~~

C-4a(~~5~~4) Data Verification

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

C-4a(~~6~~5) Data Transmittal

BDRs will include the information required by Section C3-~~10~~ 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 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 C-5a(1) for WWIS reporting requirements and the *Waste Data System User's Manual* (DOE, 2009) 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 (Sections~~3~~ C~~-12b~~3-6b(1) and C3-~~12b~~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.

C-4a(~~7~~6) Records Management

Records related to waste characterization activities performed by the generator/storage sites will be maintained in the testing~~, sampling, or analytical~~ facility files or generator/storage site project files, or at the WIPP Records Archive facility. ~~DOE-approved laboratories will forward testing, sampling, and analytical records along with BDRs, to the generator/storage site project office for inclusion in the generator/storage site's project files and to the Permittees for inclusion in the~~

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~~WIPP facility operating record.~~ 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. TRU mixed waste characterization records submitted to the Permittees shall be maintained in the WIPP facility operating record and be available for inspection by NMED.

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 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, all records shall be transferred before closeout to the Permittees for management at the WIPP Records Archive facility. Table C-~~6~~ 2 is a listing of records designated as Lifetime Records and Non-Permanent Records. Classified information will not be transferred to WIPP. Notations will be provided to the Permittees indicating the absence of classified information. The approved generator/storage site RIDS will 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. 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 Audit and Surveillance Program (Permit Attachment C6). 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 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 CIS are present (Permit Attachment C3) and that the waste characterization information meet acceptance criteria required for compliance with the WAP (Section C3-~~12b~~6b(1)).

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 WIPP. Additional audits, focusing on the results of waste characterization, will be performed at least annually. 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 (Section C3-~~10b~~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 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 CIS for that waste stream (Section C3-~~12b~~6b(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~~,~~ and 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, 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 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 all 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. 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 ~~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 until a new or revised WSPF is submitted to the Permittees and approved by 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. DOE 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.

C-5a(1) WWIS Description

All generator/storage sites planning to ship TRU mixed waste to WIPP will supply the required data to the WWIS. The WWIS Data Dictionary includes all of 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* (DOE, 2009).

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. ~~For example, totals analysis data will not be requested from sites that do not have homogeneous solids or soil/gravel waste.~~ 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 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 NMED. Table C-~~7~~ 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 at the WIPP site, 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, and three-packs), 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-~~7~~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.

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 all changes made to previously approved data.

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

The Permittees will verify the completeness and accuracy of the Waste Stream Profile Form (Section C3-~~12b~~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 results of waste analyses, as applicable;~~ the acceptable knowledge summary documentation; the methods used for characterization; the DOE certification, and 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 all 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-~~9~~ 5 to ensure that only approved wastes are accepted for management, storage, or disposal at WIPP. 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. ~~Any analytical method used will be compared to those listed in Tables C-2, C-3, and C-4 to ensure that only approved analytical methods were used for analysis of the waste.~~ 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 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: 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. 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.

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 NMED. Waste stream approval will not be reinstated until the generator/storage site demonstrates all corrective actions have been implemented and the generator/storage site waste characterization program is reassessed by DOE.

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 all AK implementation and ~~waste sampling and analysis~~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 ~~or DOE approved laboratory~~ 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.

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. 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. ~~DOE will also audit annually the DOE approved laboratories performing waste sampling and/or analysis.~~ 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 all 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 all 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 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.

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 each container holding TRU mixed waste against the WWIS database after opening the Shipping Package.

The WWIS links the bar-coded identification numbers of all containers in a specific waste shipment to the waste assembly (for 7-packs, 4-packs, 3-packs and 5-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 7-pack, 4-pack, or 3-pack) 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 or shipping cask closure date
- Package (container or canister) receipt date
- Overpack identification number (if appropriate)
- Package (container or canister) emplacement date

- Package (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 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 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 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 NMED in writing. Notifications to 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 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

TRU mixed waste designated by the Secretary of Energy for disposal at WIPP 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 WIPP 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-~~7~~3). 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 radiological exposure. If all of 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 WIPP 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 all records associated with waste shipment screening determinations.

## C-7 Records Management and Reporting

As part of the WIPP facility's operating record, data and documents associated with waste characterization and waste confirmation are managed in accordance with standard records management practices.

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 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 records inventory and disposition schedule.

The following records will be maintained for waste characterization and waste confirmation purposes as part of the WIPP facility 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
- CARs 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 all 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 WIPP facility 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) to NMED that includes information on actual volume and waste descriptions received for disposal during the time period covered by the report.

## C-9 List of References

U.S. Department of Energy (DOE), 2009, "Waste Data System User's Manual", DOE/WIPP 09-3427, 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 Carlsbad Field Office, Office of the National TRU Program, 2010, "Performance Demonstration Program Plan for Analysis of Simulated Headspace Gases," DOE/CBFO-95-1076, Current Revision, Carlsbad, New Mexico, Carlsbad Field Office, U.S. Department of Energy.~~

~~U.S. Department of Energy- Carlsbad Field Office, Office of the National TRU Program, 2010, "Performance Demonstration Program Plans for RCRA Constituent Analysis of Solidified Wastes," DOE/CBFO-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.~~

# TABLES

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~~**Table C-1**~~
~~**Summary of Hazardous Waste Characterization Requirements for Transuranic Mixed Waste**~~ [a]

| ~~**Parameter**~~ | ~~**Techniques and Procedure**~~ |
|---|---|
| ~~**Physical Waste Form**~~<br>~~**Summary**~~<br>~~**Category Names**~~<br>~~**S3000 Homogeneous Solid**~~<br>~~**S4000 Soil/Gravel**~~<br>~~**S5000 Debris Wastes**~~ | ~~**Waste Inspection Procedures**~~<br>~~**Radiography**~~<br>~~**Visual Examination**~~<br>~~**(Permit Attachment C1)**~~ |

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| ~~Parameter~~ | ~~Techniques and Procedure~~ |
|---|---|
| ~~Headspace Gases~~<br><br>~~Volatile Organic Compounds~~<br><br>~~Benzene~~<br><br>~~Bromoform~~<br><br>~~Carbon tetrachloride~~<br><br>~~Chlorobenzene~~<br><br>~~Chloroform~~<br><br>~~1,1-Dichloroethane~~<br><br>~~1,2-Dichloroethane~~<br><br>~~1,1-Dichloroethylene~~<br><br>~~(trans)-1,2-Dichloroethylene~~<br><br>~~Ethyl benzene~~<br><br>~~Ethyl ether~~<br><br>~~Methylene chloride~~<br><br>~~1,1,2,2-Tetrachloroethane~~<br><br>~~Tetrachloroethylene~~<br><br>~~Toluene~~<br><br>~~1,1,1-Trichloroethane~~<br><br>~~Trichloroethylene~~<br><br>~~1,1,2-Trichloro-1,2,2-trifluoroethane~~<br><br>~~Xylenes~~ | ~~Alcohols and Ketones~~<br><br>~~Acetone~~<br><br>~~Butanol~~<br><br>~~Methanol~~<br><br>~~Methyl ethyl ketone~~<br><br>~~Methyl isobutyl ketone~~<br><br>~~Gas Analysis~~ [8]<br><br>~~Gas Chromatography /Mass Spectroscopy (GC/MS), EPA TO-14A or TO-15, or modified SW-846 8260 ( Permit Attachment C3 )~~<br><br>~~GC/Flame Ionization Detector (FID), for alcohols and ketones, SW-846 8015 ( Permit Attachment C3 )~~<br><br>~~Fourier Transform Infrared Spectroscopy (FTIRS), SW-846~~ |
| ~~Total Volatile Organic Compounds~~ | ~~Total Volatile Organic Compound Analysis~~ [9] |

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| ~~Parameter~~ | | ~~Techniques and Procedure~~ |
|---|---|---|
| ~~Acetone~~ | ~~Isobutanol~~ | ~~TCLP, SW-846 1311~~ |
| ~~Benzene~~ | ~~Methanol~~ | ~~GC/MS, SW-846 8260~~ |
| ~~Bromoform~~ | ~~Methyl ethyl ketone~~ | ~~GC/FID, SW-846 8015 ( Permit Attachment C3 )~~ |
| ~~Butanol~~ | ~~Methylene chloride~~ | ~~HPLC, SW-846 8315A~~ |
| ~~Carbon disulfide~~ | ~~Pyridine[d]~~ | ~~Acceptable Knowledge for Summary Category S5000 (Debris Wastes)~~ |
| ~~Carbon tetrachloride~~ | ~~1,1,2,2-Tetrachloroethane~~ | |
| ~~Chlorobenzene~~ | ~~Tetrachloroethylene~~ | |
| ~~Chloroform~~ | ~~Toluene~~ | |
| ~~1,4-Dichlorobenzene[d]~~ | ~~1,1,2-Trichloro-1,2,2-trifluoroethane~~ | |
| ~~1,2-Dichlorobenzene[d]~~ | ~~Trichlorofluoromethane~~ | |
| ~~1,2-Dichloroethane~~ | ~~1,1,1-Trichloroethane~~ | |
| ~~1,1-Dichloroethylene~~ | ~~1,1,2-Trichloroethane~~ | |
| ~~Ethyl benzene~~ | ~~Trichloroethylene~~ | |
| ~~Ethyl ether~~ | ~~Vinyl chloride~~ | |
| ~~Formaldehyde[b]~~ | ~~Xylenes~~ | |
| ~~Hydrazine[c]~~ | ~~(trans)-1,2-Dichloroethylene~~ | |

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~~Table C-1~~
~~Summary of Hazardous Waste Characterization Requirements for Transuranic Mixed Waste~~ [a]

| ~~Parameter~~ | ~~Techniques and Procedure~~ |
|---|---|
| ~~Total Semivolatile Organic Compounds~~<br><br>~~Cresols~~<br><br>~~1,4-Dichlorobenzene~~ [e]<br><br>~~1,2-Dichlorobenzene~~ [e]<br><br>~~2,4-Dinitrophenol~~<br><br>~~2,4-Dinitrotoluene~~<br><br>~~Hexachlorobenzene~~<br><br>~~Hexachloroethane~~<br><br>~~Nitrobenzene~~<br><br>~~Pentachlorophenol~~<br><br>~~Pyridine~~ [e] | ~~Total Semivolatile Organic Compound Analysis~~ [g]<br><br>~~TCLP, SW-846 1311~~<br><br>~~GC/MS, SW-846 8270~~<br>~~( Permit Attachment C3 )~~<br><br>~~Acceptable Knowledge for Summary Category S5000 (Debris Wastes)~~ |
| ~~Total Metals~~<br><br>~~Antimony Mercury~~<br><br>~~Arsenic Nickel~~<br><br>~~Barium Selenium~~<br><br>~~Beryllium Silver~~<br><br>~~Cadmium Thallium~~<br><br>~~Chromium Vanadium~~<br><br>~~Lead Zinc~~ | ~~Total Metals Analysis~~ [g]<br><br>~~TCLP, SW-846 1311~~<br>~~ICP- MS, SW-846 6020 ,~~<br>~~ICP Emission Spectroscopy, SW-846 6010~~<br>~~Atomic Absorption Spectroscopy , SW-846 7000~~<br>~~( Permit Attachment C3 )~~<br><br>~~Acceptable Knowledge for Summary Category S5000 (Debris Wastes)~~ |

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[a] ~~Permit Attachment C~~

[b] ~~Required only for homogeneous solids and soil/gravel waste from Savannah River Site to resolve the assignment of EPA hazardous waste numbers.~~

[c] ~~Required only for homogeneous solids and soil/gravel waste from Oak Ridge National Laboratory and Savannah River Site to resolve the assignment of EPA hazardous waste numbers.~~

[d] ~~Can also be analyzed as a semi-volatile organic compound.~~

[e] ~~Can also be analyzed as a volatile organic compound.~~

[f] ~~Required only to resolve the assignment of EPA hazardous waste numbers to debris waste streams.~~

[g] ~~Required only to resolve the assignment of EPA hazardous waste numbers to homogeneous solid and soil/gravel waste streams.~~

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~~Table C-2~~
~~Headspace Target Analyte List and Methods~~ [b]

| ~~Parameter~~ | ~~EPA Specified Analytical Method~~ |
|---|---|
| ~~Benzene~~<br>~~Bromoform~~<br>~~Carbon tetrachloride~~<br>~~Chlorobenzene~~<br>~~Chloroform~~<br>~~1,1-Dichloroethane~~<br>~~1,2-Dichloroethane~~<br>~~1,1-Dichloroethylene~~<br>~~(trans)-1,2-Dichloroethylene~~<br>~~Ethyl benzene~~<br>~~Ethyl ether~~<br>~~Methylene chloride~~<br>~~1,1,2,2-Tetrachloroethane~~<br>~~Tetrachloroethylene~~<br>~~Toluene~~<br>~~1,1,1-Trichloroethane~~<br>~~Trichloroethylene~~<br>~~1,1,2-Trichloro-1,2,2-trifluoroethane~~<br>~~Xylenes~~ | ~~EPA: Modified TO-14A, TO-15~~ [a]~~; Modified 8260~~<br>~~EPA – Approved FTIRS~~ |
| ~~Acetone~~<br>~~Butanol~~<br>~~Methanol~~<br>~~Methyl ethyl ketone~~<br>~~Methyl isobutyl ketone~~ | ~~EPA: Modified TO-14 A, TO-15~~ [a]~~;~~<br>~~Modified 8260~~<br>~~Method 8015~~<br>~~EPA - Approved FTIRS~~ |

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[a] ~~U.S. Environmental Protection Agency (EPA), 1999, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition (EPA/625/R-96/010b). The most current revision of the specified methods may be used.~~

[b] ~~Required only for debris waste when required to resolve the assignment of EPA hazardous waste numbers.~~

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~~Table C-3~~
~~Required Organic Analyses and Test Methods Organized by Organic Analytical Groups~~ [e]

| ~~Organic Analytical Group~~ | ~~Required Organic Analyses~~ | ~~EPA Specified Analytical Method~~ [a,d] |
|---|---|---|
| ~~Nonhalogenated Volatile Organic Compounds (VOCs)~~ | ~~Acetone~~<br>~~Benzene~~<br>~~n-Butanol~~<br>~~Carbon disulfide~~<br>~~Ethyl benzene~~<br>~~Ethyl ether~~<br>~~Formaldehyde~~<br>~~Hydrazine~~[b]<br>~~Isobutanol~~<br>~~Methanol~~<br>~~Methyl ethyl ketone~~<br>~~Toluene~~<br>~~Xylenes~~ | ~~8015~~<br>~~8260~~<br>~~8315A~~ |
| ~~Halogenated VOCs~~ | ~~Bromoform~~<br>~~Carbon tetrachloride~~<br>~~Chlorobenzene~~<br>~~Chloroform~~<br>~~1,2-Dichloroethane~~<br>~~1,1-Dichloroethylene~~<br>~~(trans)-1,2-Dichloroethylene~~<br>~~Methylene chloride~~<br>~~1,1,2,2-Tetrachloroethane~~<br>~~Tetrachloroethylene~~ | ~~8015~~<br>~~8260~~ |

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| | | |
|---|---|---|
| | ~~1,1,2-Trichloroethane~~<br>~~1,1,1-Trichloroethane~~<br>~~Trichloroethylene~~<br>~~Trichlorofluoromethane~~<br>~~1,1,2-Trichloro-1,2,2-trifluoroethane~~<br>~~Vinyl Chloride~~ | |
| ~~Semivolatile Organic Compounds (SVOCs)~~ | ~~Cresols (o, m, p)~~<br>~~1,2-Dichlorobenzene[e]~~<br>~~1,4-Dichlorobenzene[e]~~<br>~~2,4-Dinitrophenol~~<br>~~2,4-Dinitrotoluene~~<br>~~Hexachlorobenzene~~<br>~~Hexachloroethane~~<br>~~Nitrobenzene~~<br>~~Pentachlorophenol~~<br>~~Pyridine[c]~~ | ~~8270~~ |

~~[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 DOE for approval.~~

~~[c] These compounds may also be analyzed as VOCs by SW-846 Method 8260.~~

~~[d] 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.~~

~~[e] Required only to resolve the assignment of EPA hazardous waste numbers.~~

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~~Table C-4~~
~~Summary of Sample Preparation and Analytical Methods for Metals~~

| ~~Parameters~~ | ~~EPA-Specified Analytical Methods[a,b,c]~~ |
|---|---|
| ~~Sample Preparation~~ | ~~3051, or equivalent, as appropriate for analytical method~~ |
| ~~Total Antimony~~ | ~~6010, 6020, 7000, 7010, 7062~~ |
| ~~Total Arsenic~~ | ~~6010, 6020, 7010, 7061, 7062~~ |
| ~~Total Barium~~ | ~~6010, 6020, 7000, 7010~~ |
| ~~Total Beryllium~~ | ~~6010, 6020, 7000, 7010~~ |
| ~~Total Cadmium~~ | ~~6010, 6020, 7000, 7010~~ |
| ~~Total Chromium~~ | ~~6010, 6020, 7000, 7010~~ |
| ~~Total Lead~~ | ~~6010, 6020, 7000, 7010~~ |
| ~~Total Mercury~~ | ~~7471~~ |
| ~~Total Nickel~~ | ~~6010, 6020, 7000, 7010~~ |
| ~~Total Selenium~~ | ~~6010, 7010, 7741, 7742~~ |
| ~~Total Silver~~ | ~~6010, 6020, 7000, 7010~~ |
| ~~Total Thallium~~ | ~~6010, 6020, 7000, 7010~~ |
| ~~Total Vanadium~~ | ~~6010, 7000, 7010~~ |
| ~~Total Zinc~~ | ~~6010, 6020, 7000, 7010~~ |

~~[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.~~

~~[c] Required only for homogeneous solids and soil/gravel to resolve the assignment of EPA hazardous waste numbers.~~

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**Table C-~~5~~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~~ |
|---|---|---|---|---|
| ~~Stored Waste~~ | | | | |
| ~~S3000-Homogeneous Solids~~ | ~~• Solidified inorganics~~<br>~~• Salt waste~~<br>~~• Solidified organics~~ | ~~Physical waste form~~ | ~~Acceptable knowledge, radiography, and/or visual examination~~ | ~~• Determine waste matrix~~<br>~~• 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~~ | ~~Hazardous constituents~~<br>~~• Listed~~<br>~~• Characteristic~~ | ~~Acceptable knowledge or statistical sampling[a] (see Tables C-3 and C-4)~~ | ~~• Determine characteristic metals and organics~~<br>~~• Resolve the assignment of EPA hazardous waste numbers~~ |
| ~~S5000-Debris Waste~~ | ~~• Uncategorized metal (metal waste other than lead/cadmium)~~<br>~~• Lead/cadmium waste~~<br>~~• Inorganic nonmetal waste~~<br>~~• Combustible waste~~<br>~~• Graphite waste~~<br>~~• Heterogeneous debris~~ | ~~Physical waste form~~ | ~~Acceptable knowledge, radiography, and/or visual examination~~ | ~~• Determine waste matrix~~<br>~~• Demonstrate compliance with waste acceptance criteria (e.g., no liquid in excess of TSDF-WAC limits, no incompatible wastes, no compressed gases)~~ |
| | | ~~Hazardous constituents~~<br>~~• Characteristic~~<br>~~• Listed~~ | ~~Statistical gas sampling and analysis[a] (see Table C-2)~~ | ~~• Resolve the assignment of EPA hazardous waste numbers~~ |

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| ~~Waste Matrix Code Summary Categories~~ | ~~Waste Matrix Code Groups~~ | ~~Characterization Parameter~~ | ~~Method~~ | ~~Rationale~~ |
|---|---|---|---|---|
| ~~Stored Waste~~ | | | | |
| | ~~waste~~<br>~~• Composite filter waste~~ | ~~Hazardous constituents~~<br>~~• Characteristic~~ | ~~Acceptable knowledge~~ | ~~• Determine characteristic metals and organics~~ |

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**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<br>• Salt waste<br>• Solidified organics | Physical waste form | Acceptable knowledge, radiography and/or visual examination | • Determine waste matrix<br>• 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)<br>• Lead/cadmium waste<br>• Inorganic nonmetal waste<br>• Combustible waste<br>• Graphite waste<br>• Heterogeneous debris waste<br>• Composite filter waste | Hazardous constituents<br>• Listed<br>• Characteristic | Acceptable knowledge | • Determine assignment of EPA hazardous waste numbers |

~~**Table C-5**~~
~~**Summary of Parameters, Characterization Methods, and Rationale for Transuranic Mixed Waste (Continued)**~~

| ~~Waste Matrix Code Summary Categories~~ | ~~Waste Matrix Code Groups~~ | ~~Characterization Parameter~~ | ~~Method~~ | ~~Rationale~~ |
|---|---|---|---|---|
| ~~Newly Generated Waste~~ | | | | |

| | | | | |
|---|---|---|---|---|
| ~~S3000-Homogeneous Solids~~ | ~~Solidified inorganics~~<br><br>~~Salt waste~~<br><br>~~Solidified organics~~ | ~~Physical waste form~~ | ~~Acceptable knowledge, radiography, and/or visual examination~~ | ~~Determine waste matrix~~<br><br>~~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~~ | ~~Hazardous constituents~~<br><br>~~Listed~~<br><br>~~Characteristic~~ | ~~Statistical sampling[a] (see Tables C-3 and C-4)~~ | ~~Determine characteristic metals and organics~~<br><br>~~Resolve the assignment of EPA hazardous waste numbers~~ |
| ~~S5000–Debris Waste~~ | ~~Uncategorized metal (metal waste other than lead/cadmium)~~<br><br>~~Lead/cadmium waste~~<br><br>~~Inorganic nonmetal waste~~<br><br>~~Combustible waste~~<br><br>~~Graphite waste~~<br><br>~~Heterogeneous debris waste~~<br><br>~~Composite filter waste~~ | ~~Physical waste form~~ | ~~Acceptable knowledge, radiography, and/or visual examination~~ | ~~Determine waste matrix~~<br><br>~~Demonstrate compliance with waste acceptance criteria (e.g., no liquid in excess of TSDF-WAC limits, no incompatible wastes, no compressed gases)~~ |
| | | ~~Hazardous constituents~~<br><br>~~Characteristic~~<br><br>~~Listed~~ | ~~Statistical gas sampling and analysis[a] (see Table C-2)~~ | ~~Resolve the assignment of EPA hazardous waste numbers~~ |
| | | ~~Hazardous constituents~~<br><br>~~Characteristic~~ | ~~Acceptable knowledge~~ | ~~Determine characteristic metals and organics~~ |

~~[a] Applies to waste streams that require sampling.~~

**Table C-~~6~~2**
**Required Program Records Maintained in Generator/Storage Site Project Files**

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

**Table C-~~7~~3**
**WIPP Waste Information System Data Fields[a]**

| Characterization Module Data Fields [b] | |
|---|---|
| Container ID [c]<br>Generator EPA ID<br>Generator Address<br>Generator Name<br>Generator Contact<br>Hazardous Code<br>~~Headspace Gas Sample Date~~<br>~~Headspace Gas Analysis Date~~<br>Layers of Packaging<br>Liner Exists<br>Liner Hole Size<br>Filter Model<br>Number of Filters Installed<br>~~Headspace Gas Analyte~~ [d]<br>~~Headspace Gas Concentration~~ [d]<br>~~Headspace Gas Char. Method~~ [d]<br>~~Total VOC Char. Method~~ [d]<br>~~Total Metals Char. Method~~ [d]<br>~~Total Semi-VOC Char. Method~~ [d]<br>Item Description Code<br>Haz. Manifest Number<br>NDE Complete [e] | ~~Total VOC Sample Date~~<br>~~Total VOC Analysis Date~~<br>~~Total VOC Analyte Name~~ [d]<br>~~Total VOC Analyte Concentration~~ [d]<br>~~Total Metal Sample Date~~<br>~~Total Metal Analysis Date~~<br>~~Total Metal Analyte Name~~ [d]<br>~~Total Metal Analyte Concentration~~ [d]<br>~~Semi-VOC Sample Date~~<br>~~Semi-VOC Analysis Date~~<br>~~Semi-VOC Analyte Name~~ [d]<br>~~Semi-VOC Concentration~~ [d]<br>Transporter EPA ID<br>Transporter Name<br>Visual Exam Container [e]<br>Waste Material Parameter [d]<br>Waste Material Weight [d]<br>Waste Matrix Code<br>Waste Matrix Code Group<br>Waste Stream Profile Number |
| Certification Module Data Fields | |
| Container ID [c]<br>Container type<br>Container Weight<br>Contact Dose Rate<br>Container Certification date<br>Container Closure Date | Handling Code |
| Transportation Data Module | |
| Contact Handled Package Number<br>Assembly Number[f]<br>Container IDs [c,d]<br>ICV Closure Date | Ship Date<br>Receive Date |
| Disposal Module Data | |
| Container ID [c]<br>Disposal Date<br>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~~waste material parameter, nuclide, etc.

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

[f] Required for 7-packs of 55-gal drums, 4-packs of 85-gal drums, or 3-packs of 100-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.

**Table C-~~8~~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-~~9~~5**
**Listing of Permitted 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.

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# FIGURES

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WASTE STREAM PROFILE FORM

Waste Stream Profile Number: _____
Generator Site Name: _____ Technical Contract: _____
Generator Site EPA ID: _____ Technical Contact Phone Number: _____
Date of audit report approval 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 one)
  - ☐ 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 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)**

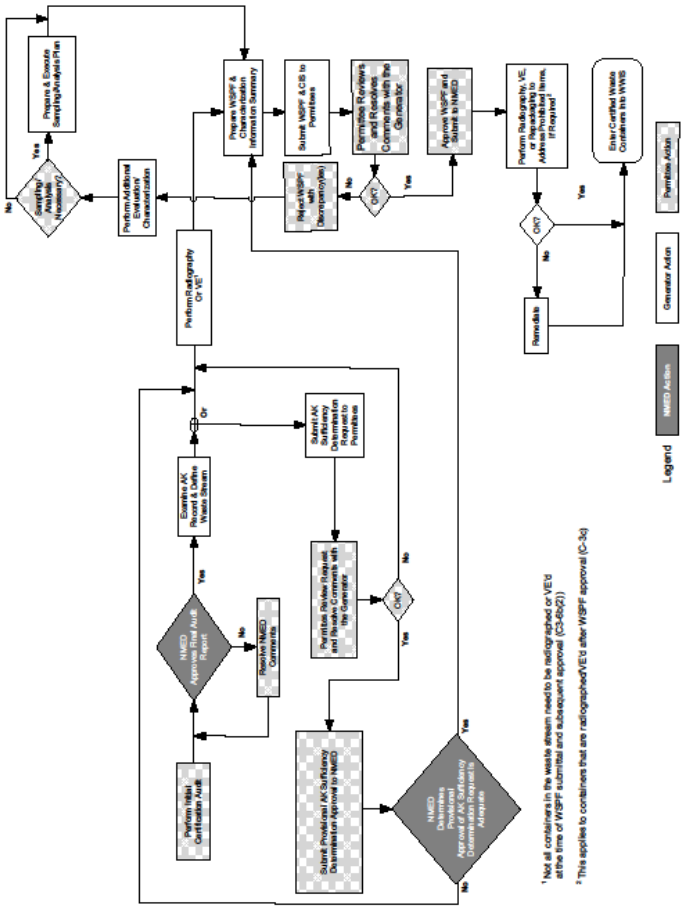


Figure C-2
Waste Characterization Process

Field Code Changed

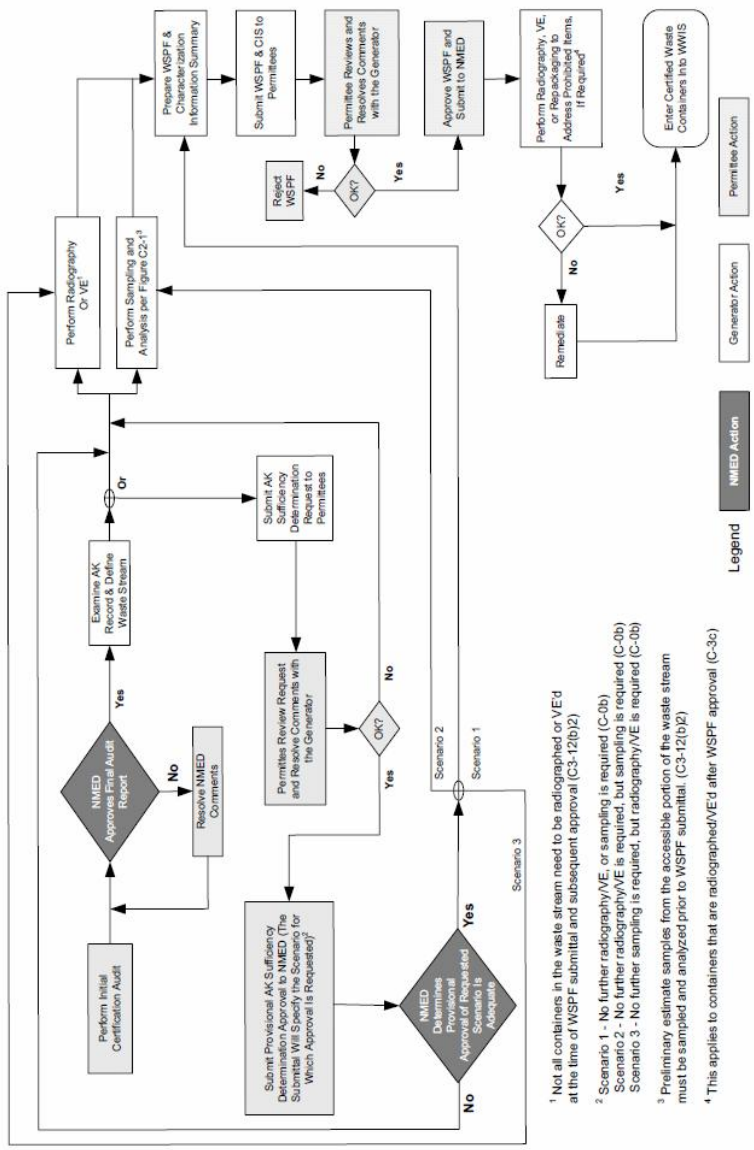


**Figure C-2**
**Waste Characterization Process**

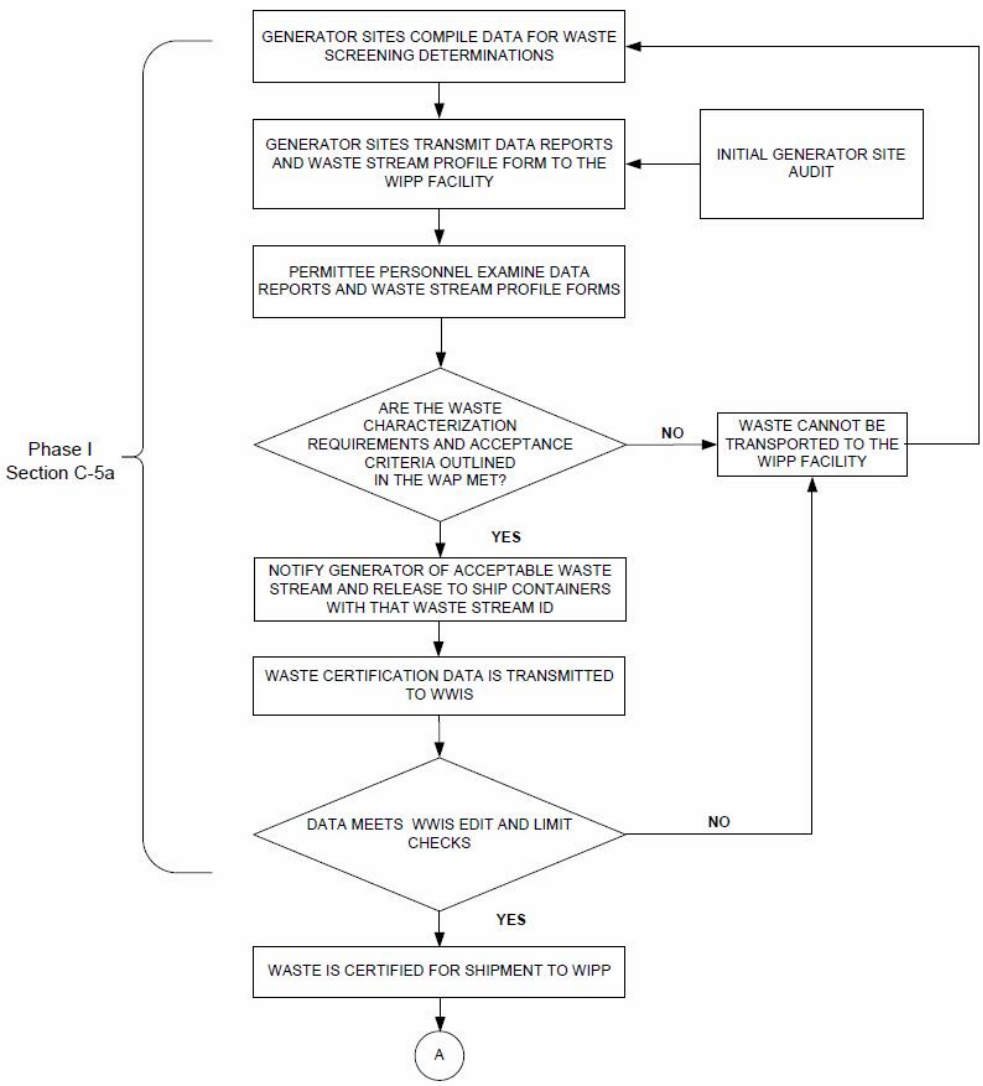


**Figure C-3**
**TRU Mixed Waste Screening and Verification**

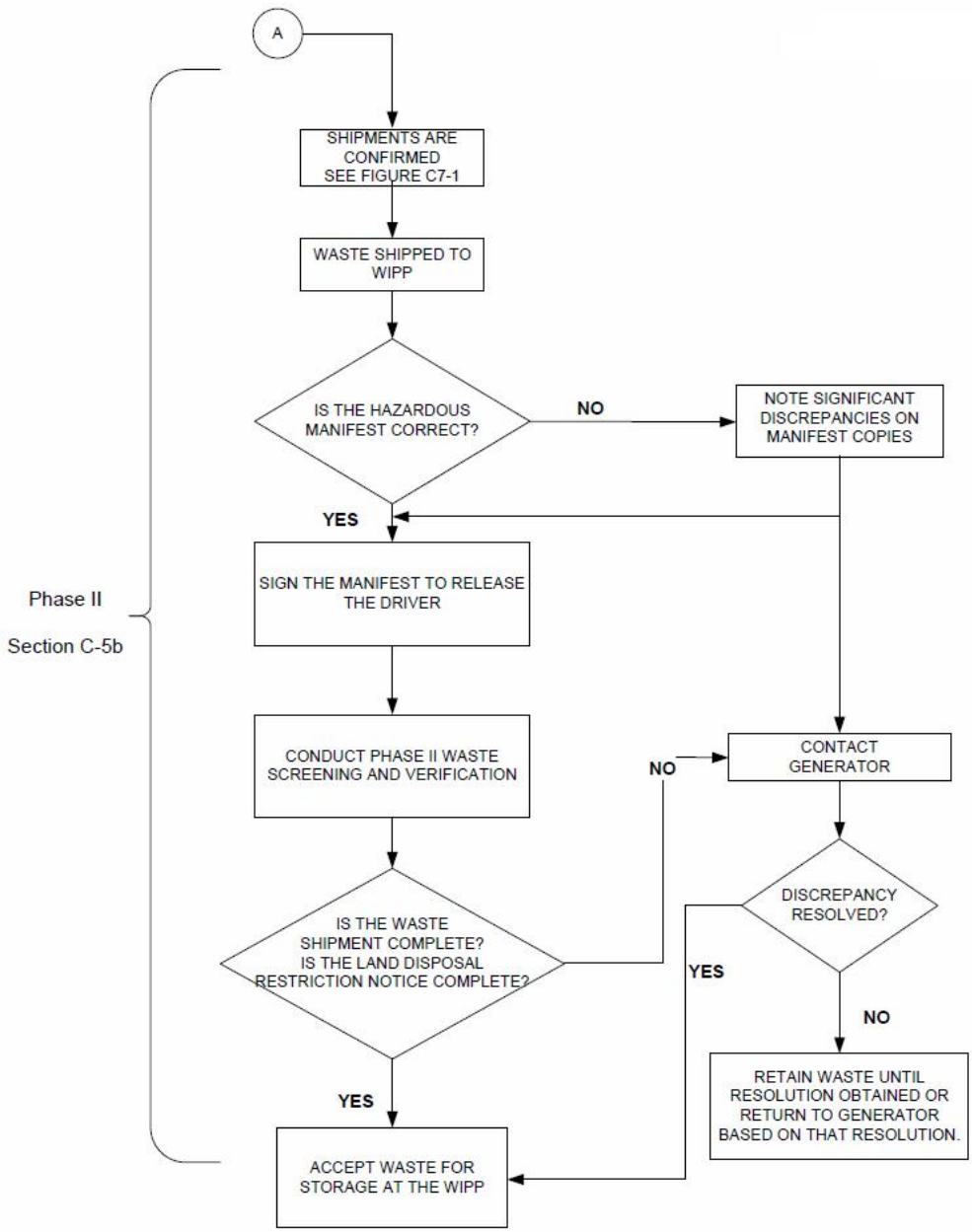


**Figure C-3**
**TRU Mixed Waste Screening and Verification (Continued)**

# ATTACHMENT C1

# WASTE CHARACTERIZATION TESTING METHODS

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# ATTACHMENT C1

# WASTE CHARACTERIZATION TESTING METHODS

## TABLE OF CONTENTS

Introduction ..... 1
C1-1 Radiography ..... 1
C1-2 Visual Examination ..... 3

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# ATTACHMENT C1

# WASTE CHARACTERIZATION TESTING METHODS

## Introduction

The Permittees will require generator/storage sites (**sites**) to use the following testing methods, as applicable, for characterization of TRU mixed waste which is managed, stored, or disposed at WIPP. These methods include requirements for radiography or visual examination. Additionally, this Attachment provides quality control requirements.

## C1-1 Radiography

Radiography has been developed by the Permittees specifically to aid in the examination and identification of containerized waste. The Permittees shall require that sites describe all activities required to achieve the radiography objectives in site QAPjPs and SOPs. These SOPs should include instructions specific to the radiography system(s) used at the site. For example, to detect liquids, some systems require the container to be rotated back and forth while other systems require the container to be tilted.

A radiography system (e.g., real time radiography, digital radiography/computed tomography) normally consists of an X-ray-producing device, an imaging system, an enclosure for radiation protection, a waste container handling system, an audio/video recording system, and an operator control and data acquisition station. Although these six components are required, it is expected there will be some variation within a given component between sites. The radiography system shall have controls or an equivalent process which allow the operator to control image quality. On some radiography systems, it should be possible to vary the voltage, typically between 150 to 400 kilovolts (**kV**), to provide an optimum degree of penetration through the waste. For example, high-density material should be examined with the X-ray device set on the maximum voltage. This ensures maximum penetration through the waste container. Low-density material should be examined at lower voltage settings to improve contrast and image definition. The imaging system typically utilizes either a fluorescent screen and a low-light television camera or x-ray detectors to generate the image.

To perform radiography, the waste container is scanned while the operator views the television screen. A video and audio recording is made of the waste container scan and is maintained as a non-permanent record. A radiography data form is also used to document the Waste Matrix Code to ensure that the waste container contains no ignitable, corrosive, or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and verify that the physical form of the waste is consistent with the waste stream description documented in the AK Summary. Containers whose contents prevent full examination of the remaining contents shall be subject to visual examination unless the site certifies that visual examination would provide no additional relevant information for that container based on the acceptable knowledge information for the waste stream. Such certification shall be documented in the generator/storage site's record.

For containers which contain classified shapes and undergo radiography, the radiography video and audio recording will be considered classified. The radiography data forms will not contain classified information.

The radiography system involves qualitative and semiquantitative evaluations of visual displays. Operator training and experience are the most important considerations for ensuring quality controls in regard to the operation of the radiography system and for interpretation and disposition of radiography results. Only trained personnel shall be allowed to operate radiography equipment.

Standardized training requirements for radiography operators shall be based upon existing industry standard training requirements.

The Permittees shall require each site to develop a training program that provides radiography operators with both formal and on-the-job (**OJT**) training. Radiography operators shall be instructed in the specific waste generating practices, typical packaging configurations, and associated waste material parameters expected to be found in each Waste Matrix Code at the site. The OJT and apprenticeship shall be conducted by an experienced, qualified radiography operator prior to qualification of the training candidate. The training programs will be site-specific due to differences in equipment, waste configurations, and the level of waste characterization efforts. For example, certain sites use digital radiography equipment, which is more sensitive than real-time radiography equipment. In addition, the particular physical forms and packaging configurations at each site will vary; therefore, radiography operators shall be trained on the types of waste that are generated, stored, and/or characterized at that particular site.

Although the Permittees shall require each site to develop its own training program, all of the radiography QC requirements specified in this WAP shall be incorporated into the training programs and radiography operations. In this way data quality and comparability will not be affected.

Radiography training programs will be the subject of the Audit and Surveillance Program (Permit Attachment C6).

One or more training containers with items (including prohibited items) common to the waste streams to be characterized and internal containers of various sizes shall be scanned semiannually by each operator. The audio and video media shall then be reviewed by a supervisor to ensure that operators' interpretations remain consistent and accurate. Imaging system characteristics shall be verified on a routine basis.

Independent replicate scans and replicate observations of the video output of the radiography process shall be performed under uniform conditions and procedures. Independent replicate scans shall be performed on one waste container per day or once per testing batch, whichever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container. Independent observations of one scan (not the replicate scan) shall also be made once per day or once per testing batch, whichever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container. A testing batch is a suite of waste containers undergoing radiography using the same testing equipment. A testing batch can be up to 20 waste containers without regard to waste matrix.

Oversight functions include periodic audio/video media reviews of accepted waste containers and shall be performed by qualified radiography operators that were not involved in the original scans of the waste containers. The results of this independent verification shall be available to the radiography operators who performed the original scans. The Permittees shall require the

site project manager to be responsible for monitoring the quality of the radiography data and calling for corrective action, when necessary.

## C1-2 Visual Examination

The waste container contents may be verified directly by visual examination (**VE**) of the waste container contents. Visual examination may be performed by physically examining the contents of waste containers to verify the Waste Matrix Code and to verify that the container is properly included in the appropriate waste stream. Visual examination shall be conducted on a waste container to identify and describe all waste items, packaging materials, and waste material parameters in the waste container. Visual examination activities shall be documented on video/audio media, or by using a second operator to provide additional verification by reviewing the contents of the waste container to ensure correct reporting. When VE is performed using a second operator, each operator performing the VE shall observe for themselves the waste being placed in the waste container or the contents within the examined waste container when waste is not removed. The results of all VE shall be documented on VE data forms, which are used to document the Waste Matrix Code, ensure that the waste container contains no ignitable, corrosive, or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and verify that the physical form of the waste is consistent with the waste stream description documented in the AK Summary.

Visual examination recorded on video/audio media shall meet the following minimum requirements:

- The video/audio media shall record the waste packaging event for the container such that all waste items placed into the container are recorded in sufficient detail and shall contain an inventory of waste items in sufficient detail that another trained VE operator can identify the associated waste material parameters.
- The video/audio media shall capture the waste container identification number.
- The personnel loading the waste container shall be identified on the video/audio media or on packaging records traceable to the loading of the waste container.
- The date of loading of the waste container will be recorded on the video/audio media or on packaging records traceable to the loading of the waste container.

Visual examination performed using two generator site personnel shall meet the following minimum requirements:

- At least two generator site personnel who witnessed the packaging of the waste shall approve the data forms or packaging records attesting to the contents of the waste container.
- The data forms or packaging records shall contain an inventory of waste items in sufficient detail that another trained VE operator can identify the associated waste material parameters.
- The waste container identification number shall be recorded on the data forms or packaging records.

Visual examination video/audio media of containers which contain classified shapes shall be considered classified information. Visual examination data forms or packaging records will not contain classified information.

Waste container packaging records may be used to meet the VE data quality objectives (**DQOs**) (Permit Attachment C, Section C-4a(1)). These records must meet the minimum requirements listed above for either VE recorded on video/audio media or VE performed by two generator/storage site personnel, and shall be reviewed by operators trained and qualified to the requirements listed below. The operators will prepare data forms based on the visual examination records. Visual examination batch data reports will be prepared, reviewed, and approved as described in Permit Attachment C, Section C-4, and Permit Attachment C3.

Standardized training for VE shall be developed. Visual examination operators shall be instructed in the specific waste generating processes, typical packaging configurations, and waste material parameters expected to be found in each Waste Matrix Code at the site. The training shall be site specific to include the various waste configurations generated/stored at the site. For example, the particular physical forms and packaging configurations at each site will vary so operators shall be trained to examine the types of waste that are generated, stored, and/or characterized at that particular site. Training will include the following regardless of Summary Category Group:

- Identifying and describing the contents of a waste container by examining all items in waste containers of previously packaged waste

- Identifying when VE cannot be used to meet the DQOs

Visual examination personnel shall be requalified once every two years.

Each VE facility shall designate a VE expert. The VE expert shall be familiar with the waste generating processes that have taken place at that site and also be familiar with all of the types of waste being characterized at that site. The VE expert shall be responsible for the overall direction and implementation of the VE at that facility. The Permittees shall require site QAPjPs to specify the selection, qualification, and training requirements of the VE expert.

**ATTACHMENT C1**

**WASTE CHARACTERIZATION ~~SAMPLING~~ TESTING METHODS**

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# ATTACHMENT C1

## WASTE CHARACTERIZATION ~~SAMPLING~~ TESTING METHODS

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# ATTACHMENT C1

## WASTE CHARACTERIZATION ~~SAMPLING~~ TESTING METHODS

Introduction

The Permittees will require generator/storage sites (**sites**) to use the following testing methods, as applicable, for characterization of TRU mixed waste which is managed, stored, or disposed at WIPP. These methods include requirements for ~~headspace gas sampling, sampling of homogeneous solids and soil/gravel, and~~ radiography or visual examination. Additionally, this Attachment provides quality control~~, sample custody, and sample packing and shipping~~ requirements.

~~C1-1 Sampling of Debris Waste (Summary Category S5000)~~

~~Headspace gas sampling and analysis shall be used to resolve the assignment of Environmental Protection Agency (**EPA**) hazardous waste numbers to debris waste streams.~~

~~C1-1a Method Requirements~~

~~The Permittees shall require all headspace gas sampling be performed in an appropriate radiation containment area on waste containers that are in compliance with the container equilibrium requirements (i.e., 72 hours at 18° C or higher).~~

~~For those waste streams without an acceptable knowledge (**AK**) Sufficiency Determination approved by the U.S. Department of Energy (**DOE**), containers shall be randomly selected from waste streams designated as summary category S5000 (Debris waste) and shall be categorized under one of the sampling scenarios shown in Table C1-5 and depicted in Figure C1-1. If the container is categorized under Scenario 1, the applicable drum age criteria (**DAC**) from Table C1-6 must be met prior to headspace gas sampling. If the container is categorized under Scenario 2, the applicable Scenario 1 DAC from Table C1-6 must be met prior to venting the container and then the applicable Scenario 2 DAC from Table C1-7 must be met after venting the container. The DAC for Scenario 2 containers that contain filters or rigid liner vent holes other than those listed in Table C1-7 shall be determined using footnotes "a" and "b" in Table C1-7. Containers that have not met the Scenario 1 DAC at the time of venting must be categorized under Scenario 3. Containers categorized under Scenario 3 must be placed into one of the Packaging Configuration Groups listed in Table C1-8. If a specific packaging configuration cannot be determined based on the data collected during packaging and/or repackaging (Attachment C, Section C-3d(1)), a conservative default Packaging Configuration Group of 3 for 55-gallon drums and shielded containers, 6 for Standard Waste Boxes (**SWBs**) ten-drum overpacks (**TDOPs**), and standard larged box 2s (**SLB2s**), and 8 for 85-gallon and 100-gallon drums must be assigned, provided the drums do not contain pipe component packaging. If a container is designated as Packaging Configuration Group 4 (i.e., a pipe component), the headspace gas sample must be taken from the pipe component headspace. Drums, TDOPs, SLB2s, or SWBs that contain compacted 55-gallon drums containing a rigid liner may not be disposed of under any packaging configuration unless headspace gas sampling was performed before compaction in accordance with this waste analysis plan (**WAP**). The DAC for Scenario 3 containers that contain rigid liner vent holes that are undocumented during packaging, repackaging, and/or venting (Section C1-1a[4][ii]) shall be determined using~~

~~the default conditions in footnote "b" in Table C1-9.The DAC for Scenario 3 containers that contain filters that are either undocumented or are other than those listed in Table C1-9 shall be determined using footnote 'a' in Table C1-9. Each of the Scenario 3 containers shall be sampled for headspace gas after waiting the DAC in Table C1-9 based on its packaging configuration (note: Packaging Configuration Groups 4, 5, 6, 7, and 8 are not summary category group dependent, and 85-gallon drum, 100-gallon drum, SWB, TDOP, and SLB2 requirements apply when the 85-gallon drum, 100-gallon drum, SWB, TDOP, or SLB2 is used for the direct loading of waste).~~

~~C1-1a(1) General Requirements~~

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~~The determination of packaging configuration consists of identifying the number of confinement layers and the identification of rigid poly liners when present. Generator/storage sites shall use either the default conditions specified in Tables C1-7 through C1-9 for retrievably stored waste or the data documented during packaging, repackaging, and/or venting (Section C1-1a[4][ii]) for determining the appropriate DAC for each container from which a headspace gas sample is collected. These drum age criteria are to ensure that the container contents have reached 90 percent of steady state concentration within each layer of confinement (Lockheed, 1995; BWXT, 2000). The following information must be reported in the headspace gas sampling documents for each container from which a headspace gas sample is collected:~~

- ~~sampling scenario from Table C1-5 and associated information from Tables C1-6 and/or Table C1-7;~~

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- ~~the packaging configuration from Table C1-8 and associated information from Table C1-9, including the diameter of the rigid liner vent hole, the number of inner bags, the number of liner bags, the presence/absence of drum liner, and the filter hydrogen diffusivity,~~

- ~~the permit-required equilibrium time,~~

- ~~the drum age,~~

- ~~for supercompacted waste, both~~

- ~~the absence of rigid liners in the compacted 55-gallon drums which have not been headspace gas sampled in accordance with this permit prior to compaction, and~~

- ~~the absence of layers of confinement must be documented in the WWIS if Packaging Configuration Group 7 is used.~~

~~For all retrievably stored waste containers, the rigid liner vent hole diameter must be assumed to be 0.3 inches unless a different size is documented during drum venting or repackaging. For all retrievably stored waste containers, the filter hydrogen diffusivity must be assumed to be the most restrictive unless container-specific information clearly identifies a filter model and/or diffusivity characteristic that is less restrictive. For all retrievably stored waste containers that have not been repackaged, acceptable knowledge shall not be used to justify any packaging configuration less conservative than the default (i.e., Packaging Configuration Group 3 for 55-gallon drums and shielded containers, 6 for SWBs TDOPs, and SLB2s, and 8 for 85-gallon and 100-gallon drums). For information reporting purposes listed above, sites may report the default packaging configuration for retrievably stored waste without further verification.~~

~~All waste containers with unvented rigid containers greater than 4 liters (exclusive of rigid poly liners) shall be subject to innermost layer of containment sampling or shall be vented prior to initiating drum age and equilibrium criteria. When sampling the rigid poly liner under Scenario 1, the sampling device must form an airtight seal with the rigid poly liner to ensure that a representative sample is collected (using a sampling needle connected to the sampling head to pierce the rigid poly liner, and that allows for the collection of a representative sample, satisfies this requirement). The configuration of the containment area and remote-handling equipment at each sampling facility are expected to differ. Headspace-gas samples will be analyzed for the analytes listed in Table C3-2 of Permit Attachment C3. If additional packaging configurations are identified, an appropriate Permit Modification will be submitted to incorporate the DAC using the methodology in BWXT (2000). Consistent with footnote "a" in Table C1-8, any waste container selected for headspace gas sampling that cannot be assigned a packaging configuration specified in Table C1-8 shall be assigned a conservative default packaging configuration..~~

~~Drum age criteria apply only to 55-gallon drums, 85-gallon drums, 100-gallon drums, SWBs, TDOPs, SLB2s, and shielded containers. Drum age criteria for all other container types must be established through permit modification prior to performing headspace gas sampling.~~

~~The Permittees shall require site personnel to collect samples in SUMMA® or equivalent canisters using standard headspace-gas sampling methods that meet the general guidelines established by the EPA in the Compendium Method TO-14A or TO-15, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air (EPA, 1999) or by using on-line integrated sampling/analysis systems. Samples will be directed to an analytical instrument instead of being collected in SUMMA® or equivalent canisters if a single-sample on-line integrated sampling/analysis system is used. If a multi-sample on-line integrated sampling/analysis system is used, samples will be directed to an integrated holding area that meets the cleaning requirements of Section C1-1c(1). The leak-proof and inert nature of the integrated holding area interior surface must be demonstrated and documented. Samples are not transported to another location when using on-line integrated sampling/analysis systems; therefore, the sample custody requirements of Section C1-4 and C1-5 do not apply. The same sampling manifold and sampling heads are used with on-line integrated sampling/analysis systems and all of the requirements associated with sampling manifolds and sampling heads must be met. However, when using an on-line integrated sampling/analysis system, the sampling batch and analytical batch quality control (**QC**) samples are combined as on-line batch QC samples as outlined in Section C1-1b.~~

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~~C1-1a(2) Manifold Headspace Gas Sampling~~

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~~This headspace-gas sampling protocol employs a multiport manifold capable of collecting multiple simultaneous headspace samples for analysis and QC purposes. The manifold can be used to collect samples in SUMMA® or equivalent canisters or as part of an on-line integrated sampling/analysis system. The sampling equipment will be leak-checked and cleaned prior to first use and as needed thereafter. The manifold and sample canisters will be evacuated to 0.0039 inches (in.) (0.10 millimeters [mm]) mercury (**Hg**) prior to sample collection. Cleaned and evacuated sample canisters will be attached to the evacuated manifold before the manifold inlet valve is opened. The manifold inlet valve will be attached to a changeable filter connected to either a side port needle sampling head capable of forming an airtight seal (for penetrating a filter or rigid poly liner when necessary), a drum punch sampling head capable of forming an airtight seal (capable of punching through the metal lid of a drum for sampling through the drum~~

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~~lid), or a sampling head with an airtight fitting for sampling through a pipe overpack container filter vent hole. Refer to Section C1-1a(4) for descriptions of these sampling heads.~~

~~The manifold shall also be equipped with a purge assembly that allows applicable QC samples to be collected through all sampling components that may affect compliance with the quality assurance objectives (**QAOs**). The Permittees shall require the sites to demonstrate and document the effectiveness of the sampling equipment design in meeting the QAOs. Field blanks shall be samples of room air collected in the sampling area in the immediate vicinity of the waste container to be sampled. If using SUMMA® or equivalent canisters, field blanks shall be collected directly into the canister, without the use of the manifold.~~

~~The manifold, the associated sampling heads, and the headspace-gas sample volume requirements shall be designed to ensure that a representative sample is collected. The manifold internal volume must be calculated and documented in a field logbook dedicated to headspace-gas sample collection. The total volume of headspace gases collected during each sampling operation will be determined by adding the combined volume of the canisters attached to the manifold and the internal volume of the manifold. The sample volume should remain small in comparison to the volume of the waste container. When an estimate of the available headspace gas volume in the drum can be made, less than 10 percent of that volume should be withdrawn.~~

~~As illustrated in Figure C1-2, the sampling manifold must consist of a sample side and a standard side. The dotted line in Figure C1-2 indicates how the sample side shall be connected to the standard side for cleaning and collecting equipment blanks and field reference standards. The sample side of the sampling manifold shall consist of the following major components:~~

- ~~An applicable sampling head that forms a leak-tight connection with the headspace sampling manifold.~~

- ~~A flexible hose that allows movement of the sampling head from the purge assembly (standard side) to the waste container.~~

- ~~A pressure sensor(s) that must be pneumatically connected to the manifold. This manifold pressure sensor(s) must be able to measure absolute pressure in the range from 0.002 in. (0.05 mm) Hg to 39.3 in. (1,000 mm) Hg. Resolution for the manifold pressure sensors must be ±0.0004 in. (0.01 mm) Hg at 0.002 in. (0.05 mm) of Hg. The manifold pressure sensor(s) must have an operating range from approximately 59°F (15°C) to 104°F (40°C).~~

- ~~Available ports for attaching sample canisters. If using canister-based sampling methods, a sufficient number of ports shall be available to allow simultaneous collection of headspace-gas samples and duplicates for VOC analyses. If using an on-line integrated sampling/analysis system, only one port is necessary for the collection of comparison samples. Ports not occupied with sample canisters during cleaning or headspace-gas sampling activities require a plug to prevent ambient air from entering the system. In place of using plugs, sites may choose to install valves that can be closed to prevent intrusion of ambient air into the manifold. Ports shall have VCR® fittings for connection to the sample canister(s) to prevent degradation of the fittings on the canisters and manifold.~~

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- ~~Sample canisters, as illustrated in Figure C1-3, are leak-free, stainless steel pressure vessels, with a chromium-nickel oxide (**Cr-NiO**) SUMMA®-passivated interior surface, bellows valve, and a pressure/vacuum gauge. Equivalent designs, such as Silco Steel canisters, may be used so long as the leak-proof and inert nature of the canister interior surface is demonstrated and documented. All sample canisters must have VCR® fittings for connection to sampling and analytical equipment. The pressure/vacuum gauge must be mounted on each manifold. The canister must be helium-leak tested to $1.5 \times 10^{-7}$ standard cubic centimeters per second (cc/s), have all stainless steel construction, and be capable of tolerating temperatures to 125°C. The gauge range shall be capable of operating in the leak test range as well as the sample collection range.~~

- ~~A dry vacuum pump with the ability to reduce the pressure in the manifold to 0.05 mm Hg. A vacuum pump that requires oil may be used, but precautions must be taken to prevent diffusion of oil vapors back to the manifold. Precautions may include the use of a molecular sieve and a cryogenic trap in series between the headspace sampling ports and the pump.~~

- ~~A minimum distance, based upon the design of the manifold system, between the tip of the needle and the valve that isolates the pump from the manifold in order to minimize the dead volume in the manifold.~~

- ~~If real-time equipment blanks are not available, the manifold must be equipped with an organic vapor analyzer (**OVA**) that is capable of detecting all analytes listed in Table C3-2 of Permit Attachment C3. The OVA shall be capable of measuring total VOC concentrations below the lowest headspace gas PRQL. Detection of 1,1,2-trichloro-1,2,2-trifluoroethane may not be possible if a photoionization detector is used. The OVA measurement shall be verified by the collection of equipment blanks at the frequency specified in Section C1-1 to check for manifold cleanliness.~~

~~The standard side must consist of the following major elements:~~

- ~~A cylinder of compressed zero air, helium, argon, or nitrogen gas that is hydrocarbon and carbon dioxide (**$CO_2$**)-free (only hydrocarbon and $CO_2$-free gases required for Fourier Transform Infrared System [**FTIRS**]) to clean the manifold between samples and to provide gas for the collection of equipment blanks or on-line blanks. These high-purity gases shall be certified by the manufacturer to contain less than one ppm total VOCs. The gases must be metered into the standard side of the manifold using devices that are corrosion-proof and that do not allow for the introduction of manifold gas into the purge gas cylinders or generator. Alternatively, a zero air or nitrogen generator may be used, provided a sample of the zero air or nitrogen is collected and demonstrated to contain less than one ppm total VOCs. Zero air or nitrogen from a generator shall be humidified (except for use with FTIRS).~~

- ~~Cylinders of field-reference standard gases or on-line control sample gases. These cylinders provide gases for evaluating the accuracy of the headspace-gas sampling process. Each cylinder of field-reference gas or on-line control sample gas shall have a flow-regulating device. The field-reference standard gases or on-line control sample gas shall be certified by the manufacturer to contain analytes from Table C3-2 of Permit Attachment C3 at known concentrations.~~

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- If using an analytical method other than FTIRS a humidifier filled with American Society for Testing and Materials (**ASTM**) Type I or II water, connected, and opened to the standard side of the manifold between the compressed gas cylinders and the purge assembly shall be used. Dry gases flowing to the purge assembly will pick up moisture from the humidifier. Moisture is added to the dry gases to condition the equipment blanks and field-reference standards and to assist with system cleaning between headspace-gas sample collection. If using FTIRS for analysis, the sample and sampling system shall be kept dry.

NOTE: Caution should be exercised to isolate the humidifier during the evacuation of the system to prevent flooding the manifold. In lieu of the humidifier, the compressed gas cylinders (e.g., zero air and field-reference standard gas) may contain water vapor in the concentration range of 1,000 to 10,000 parts per million by volume (**ppmv**).

- A purge assembly that allows the sampling head (sample side) to be connected to the standard side of the manifold. The ability to make this connection is required to transfer gases from the compressed gas cylinders to the canisters or on-line analytical instrument. This connection is also required for system cleaning.

- A flow-indicating device or a pressure regulator that is connected to the purge assembly to monitor the flow rate of gases through the purge assembly. The flow rate or pressure through the purge assembly shall be monitored to assure that excess flow exists during cleaning activities and during QC sample collection. Maintaining excess flow will prevent ambient air from contaminating the QC samples and allow samples of gas from the compressed gas cylinders to be collected near ambient pressure.

In addition to a manifold consisting of a sample side and a standard side, the area in which the manifold is operated shall contain sensors for measuring ambient pressure and ambient temperature, as follows:

- The ambient-pressure sensor must have a sufficient measurement range for the ambient barometric pressures expected at the sampling location. It must be kept in the sampling area during sampling operations. Its resolution shall be 0.039 in. (1.0 mm) Hg or less, and calibration performed by the manufacturer shall be based on National Institute of Standards and Technology (**NIST**), or equivalent, standards.

- The temperature sensor shall have a sufficient measurement range for the ambient temperatures expected at the sampling location. The measurement range of the temperature sensor must be from 18°C to 50°C. The temperature sensor calibration shall be traceable to NIST, or equivalent, standards.

C1-1a(3) Direct Canister Headspace Gas Sampling

This headspace-gas sampling protocol employs a canister-sampling system to collect headspace-gas samples for analysis and QC purposes without the use of the manifold described above. Rather than attaching sampling heads to a manifold, in this method the sampling heads are attached directly to an evacuated sample canister as shown in Figure C1-4.

Canisters shall be evacuated to 0.0039 in. (0.10 mm) Hg prior to use and attached to a changeable filter connected to the appropriate sampling head. The sampling head(s) must be capable of either punching through the metal lid of the drums (and/or the rigid poly liner when

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~~necessary) while maintaining an airtight seal when sampling through the drum lid, penetrating a filter or the septum in the orifice of the self-tapping screw, or maintaining an airtight seal for sampling through a pipe overpack container filter vent hole to obtain the drum headspace samples. Field duplicates must be collected at the same time, in the same manner, and using the same type of sampling apparatus as used for headspace-gas sample collection. Field blanks shall be samples of room air collected in the immediate vicinity of the waste-drum sampling area prior to removal of the drum lid. Equipment blanks and field-reference standards must be collected using a purge assembly equivalent to the standard side of the manifold described above. These samples shall be collected from the needle tip through the same components (e.g., needle and filter) that the headspace-gas samples pass through.~~

~~The sample canisters, associated sampling heads, and the headspace-sample volume requirements ensure that a representative sample is collected. When an estimate of the available headspace-gas volume of the waste container can be made, less than 10 percent of that volume should be withdrawn. A determination of the sampling head internal volume shall be made and documented. The total volume of headspace gases collected during each headspace gas sampling operation can be determined by adding the volume of the sample canister(s) attached to the sampling head to the internal volume of the sampling head. Every effort shall be made to minimize the internal volume of sampling heads.~~

~~Each sample canister used with the direct canister method shall have a pressure/vacuum gauge capable of indicating leaks and sample collection volumes. Canister gauges are intended to be gross leak-detection devices not vacuum-certification devices. If a canister pressure/vacuum gauge indicates an unexpected pressure change, determination of whether the change is a result of ambient temperature and pressure differences or a canister leak shall be made. This gauge shall be helium-leak tested to $1.5 \times 10^{-7}$ standard cc/s, have all stainless steel construction, and be capable of tolerating temperatures to 125°C.~~

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~~The SUMMA® or equivalent sample canisters as specified in EPA's Compendium Method TO-14A or TO-15 (EPA 1999) shall be used when sampling each drum. These heads shall form a leak-tight connection with the canister and allow sampling through the drum lid filter, through the drum lid itself and/or rigid poly liner when necessary (by use of a punch or self-tapping screw), using an airtight fitting to collect the sample through the filter vent hole of a pipe overpack container, or using a hollow side port needle. Figure C1-4 illustrates the direct canister sampling equipment.~~

~~C1-1a(4) Sampling Heads~~

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~~A sample of the headspace gas directly under the container lid, pipe overpack filter vent hole, or rigid poly liner shall be collected. Several methods have been developed for collecting a representative sample: sampling through the filter, sampling through the drum lid by drum punching, sampling through a pipe overpack container filter vent hole, and sampling through the rigid poly liner. The chosen sampling method shall preserve the integrity of the drum to contain radionuclides (e.g., replace the damaged filter, replace set screw in filter housing, seal the punched drum lid).~~

~~C1-1a(4)(i) Sampling Through the Filter~~

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~~To sample the drum-headspace gas through the drum's filter, a side-port needle (e.g., a hollow needle sealed at the tip with a small opening on its side close to the tip) shall be pressed~~

~~through the filter and into the headspace beneath the drum lid. This permits the gas to be drawn into the manifold or directly into the canister(s). To assure that the sample collected is representative, all of the general method requirements, sampling apparatus requirements, and QC requirements described in this section shall be met in addition to the following requirements that are pertinent to drum headspace-gas sampling through the filter:~~

- ~~The lid of the drum's 90-mil rigid poly liner shall contain a hole for venting to the drum headspace. A representative sample cannot be collected from the drum headspace until the 90-mil rigid poly liner has been vented. If the DAC for Scenario 1 is met, a sample may be collected from inside the 90-mil rigid poly liner. If the sample is collected by removing the drum lid, the sampling device shall form an airtight seal with the rigid poly liner to prevent the intrusion of outside air into the sample (using a sampling needle connected to the sampling head to pierce the rigid poly liner satisfies this requirement). If headspace-gas samples are collected from the drum headspace prior to venting the 90-mil rigid poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved. Nonconformance procedures are outlined in Permit Attachment C3.~~

- ~~For sample collection, the drum's filter shall be sealed to prevent outside air from entering the drum and diluting and/or contaminating the sample.~~

~~The sampling head for collecting drum headspace by penetrating the filter shall consist of a side-port needle, a filter to prevent particles from contaminating the gas sample, and an adapter to connect the side-port needle to the filter. To prevent cross contamination, the sampling head shall be cleaned or replaced after sample collection, after field-reference standard collection, and after field-blank collection. The following requirements shall also be met:~~

- ~~The housing of the filter shall allow insertion of the sampling needle through the filter element or a sampling port with septum that bypasses the filter element into the drum headspace.~~

- ~~The side-port needle shall be used to reduce the potential for plugging.~~

- ~~The purge assembly shall be modified for compatibility with the side-port needle.~~

~~C1-1a(4)(ii) Sampling Through the Drum Lid By Drum Lid Punching~~

~~Sampling through the drum lid at the time of drum punching or thereafter may be performed as an alternative to sampling through the drum's filter if an airtight seal can be maintained. To sample the drum headspace-gas through the drum lid at the time of drum punching or thereafter, the lid shall be breached using an appropriate punch. The punch shall form an airtight seal between the drum lid and the manifold or direct canister sampling equipment. To assure that the sample collected is representative, all of the general method requirements, sampling apparatus requirements, and QC requirements specified in EPA's Compendium Method TO-14A or TO-15 (EPA 1999) as appropriate, shall be met in addition to the following requirements:~~

- ~~The seal between the drum lid and sampling head shall be designed to minimize intrusion of ambient air.~~

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- ~~All components of the sampling system that come into contact with sample gases shall be purged with humidified zero air, nitrogen, or helium prior to sample collection.~~

- ~~Equipment blanks and field reference standards shall be collected through all the components of the punch that contact the headspace-gas sample.~~

- ~~Pressure shall be applied to the punch until the drum lid has been breached.~~

- ~~Provisions shall be made to relieve excessive drum pressure increases during drum-punch operations; potential pressure increases may occur during sealing of the drum punch to the drum lid.~~

- ~~The lid of the drum's 90-mil rigid poly liner shall contain a hole for venting to the drum headspace. A representative sample cannot be collected from the drum headspace until the 90-mil rigid poly liner has been vented. If the DAC for Scenario 1 is met, a sample may be collected from inside the 90-mil rigid poly liner. If headspace-gas samples are collected from the drum headspace prior to venting the 90-mil rigid poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved. Nonconformance procedures are outlined in Permit Attachment C3.~~

- ~~During sampling, the drum's filter, if present, shall be sealed to prevent outside air from entering the drum.~~

- ~~While sampling through the drum lid using manifold sampling, a flow indicating device or pressure regulator to verify flow of gases shall be pneumatically connected to the drum punch and operated in the same manner as the flow-indicating device described above in Section C1-1a(2).~~

- ~~Equipment shall be used to adequately secure the drum-punch sampling system to the drum lid.~~

- ~~If the headspace gas sample is not taken at the time of drum punching, the presence and diameter of the rigid liner vent hole shall be documented during the punching operation for use in determining an appropriate Scenario 2 DAC.~~

~~C1-1a(4)(iii) Sampling Through a Pipe Overpack Container Filter Vent Hole~~

~~Sampling through an existing filter vent hole in a pipe overpack container (**POC**) may be performed as an alternative to sampling through the POC's filter if an airtight seal can be maintained. To sample the container headspace-gas through a POC filter vent hole, an appropriate airtight seal shall be used. The sampling apparatus shall form an airtight seal between the POC surface and the manifold or direct canister sampling equipment. To assure that the sample collected is representative, all of the general method, sampling apparatus, and QC requirements specified in EPA's Compendium Method TO-14A or TO-15 (EPA 1999) as appropriate, shall be met in addition to the following requirements:~~

- ~~The seal between the POC surface and sampling apparatus shall be designed to minimize intrusion of ambient air.~~

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- ~~The filter shall be replaced as quickly as is practicable with the airtight sampling apparatus to ensure that a representative sample can be taken. Sites must provide documentation demonstrating that the time between removing the filter and installing the airtight sampling device has been established by testing to assure a representative sample.~~

- ~~All components of the sampling system that come into contact with sample gases shall be cleaned according to requirements for direct canister sampling or manifold sampling, whichever is appropriate, prior to sample collection.~~

- ~~Equipment blanks and field reference standards shall be collected through all the components of the sampling system that contact the headspace-gas sample.~~

- ~~During sampling, openings in the POC shall be sealed to prevent outside air from entering the container.~~

- ~~A flow-indicating device shall be connected to sampling system and operated according to the direct canister or manifold sampling requirements, as appropriate.~~

~~C1-1b Quality Control~~

~~For manifold and direct canister sampling systems, field QC samples shall be collected on a per sampling batch basis. A sampling batch is a suite of samples collected consecutively using the same sampling equipment within a specific time period. A sampling batch can be up to 20 samples (excluding QC samples), all of which shall be collected within 14 days of the first sample in the batch. For on-line integrated sampling/analysis systems, QC samples shall be collected and analyzed on a per on-line batch basis. Holding temperatures and container requirements for gas sample containers are provided in Table C1-1. An on-line batch is the number of headspace-gas samples collected within a 12-hour period using the same on-line integrated analysis system. The analytical batch requirements are specified by the analytical method being used in the on-line system. Table C1-2 provides a summary of field QC sample collection requirements. Table C1-3 provides a summary of QC sample acceptance criteria.~~

~~For on-line integrated sampling analysis systems, the on-line batch QC samples serve as combined sampling batch/analytical batch QC samples as follows:~~

- ~~The on-line blank replaces the equipment blank and laboratory blank~~

- ~~The on-line control sample replaces the field reference standard and laboratory control sample~~

- ~~The on-line duplicate replaces the field duplicate and laboratory duplicate~~

~~The acceptance criteria for on-line batch QC samples are the same as for the sampling batch and analytical batch QC samples they replace. Acceptance criteria are shown in Table C1-3. A separate field blank shall still be collected and analyzed for each on-line batch. However, if the results of a field blank collected through the sampling manifold meets the acceptance criterion, a separate on-line blank need not be collected and analyzed.~~

~~The Permittees shall require the site project manager to monitor and document field QC sample results and fill out a nonconformance report if acceptance or frequency criteria are not met. The~~

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~~Permittees shall require the site project manager to ensure appropriate corrective action is taken if acceptance criteria are not met.~~

~~C1-1b(1) Field Blanks~~

~~Field blanks shall be collected to evaluate background levels of program-required analytes. Field blanks shall be collected prior to sample collection, and at a frequency of one per sampling batch. The Permittees shall require the site project manager to use the field blank data to assess impacts of ambient contamination, if any, on the sample results. Field blank results determined by gas chromatography/mass spectrometry and gas chromatography/flame ionization detection shall be acceptable if the concentration of each VOC analyte is less than or equal to three times the method detection limit (**MDL**) listed in Table C3-2 in Permit Attachment C3. Field blank results determined by FTIRS shall be acceptable if the concentration of each VOC analyte is less than the program required quantitation limit listed in Table C3-2. A nonconformance report shall be initiated and resolved if the final reported QC sample results do not meet the acceptance criteria.~~

~~C1-1b(2) Equipment Blanks~~

~~Equipment blanks shall be collected to assess cleanliness prior to first use after cleaning of all sampling equipment. On-line blanks will be used to assess equipment cleanliness as well as analytical contamination. After the initial cleanliness check, equipment blanks collected through the manifold shall be collected at a frequency of one per sampling batch for VOC analysis or one per day, whichever is more frequent. If the direct canister method is used, field blanks may be used in lieu of equipment blanks. The Permittees shall require the site project manager to use the equipment blank data to assess impacts of potentially contaminated sampling equipment on the sample results. Equipment blank results determined by gas chromatography/mass spectrometry or gas chromatography/flame ionization detection shall be acceptable if the concentration of each VOC analyte is less than or equal to three times the MDL listed in Table C3-2 in Permit Attachment C3. Equipment blank results determined by FTIRS shall be acceptable if the concentration of each VOC analyte is less than the program required quantitation limit listed in Table C3-2.~~

~~C1-1b(3) Field Reference Standards~~

~~Field reference standards shall be used to assess the accuracy with which the sampling equipment collects VOC samples into SUMMA® or equivalent canisters prior to first use of the sampling equipment. The on-line control sample will be used to assess the accuracy with which the sampling equipment collects VOC samples as well as an indicator of analytical accuracy for the on-line sampling system. Field reference standards shall contain a minimum of six of the analytes listed in Table C3-2 in Permit Attachment C3 at concentrations within a range of 10 to 100 ppmv and greater than the MDL for each compound. Field reference standards shall have a known valid relationship to a nationally recognized standard (e.g., NIST), if available. If NIST traceable standards are not available and commercial gases are used, a Certificate of Analysis from the manufacturer documenting traceability is required. Commercial stock gases shall not be used beyond their manufacturer-specified shelf life. After the initial accuracy check, field reference standards collected through the manifold shall be collected at a frequency of one per sampling batch and submitted as blind samples to the analytical laboratory. For the direct canister method, field reference standard collection may be discontinued if the field reference standard results demonstrate the QAO for accuracy specified in Attachment C3. Field reference~~

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~~standard results shall be acceptable if the accuracy for each tested compound has a recovery of 70 to 130 percent.~~

~~C1-1b(4) Field Duplicates~~

~~Field duplicate samples shall be collected sequentially and in accordance with Table C1-1 to assess the precision with which the sampling procedure can collect samples into SUMMA® or equivalent canisters. Field duplicates will also serve as a measure of analytical precision for the on-line sampling system. Field duplicate results shall be acceptable if the relative percent difference is less than or equal to 25 for each tested compound found in concentrations greater than the PRQL in both duplicates.~~

~~C1-1c Equipment Testing, Inspection and Maintenance~~

~~All sampling equipment components that come into contact with headspace sample gases shall be constructed of relatively inert materials such as stainless steel or Teflon®. A passivated interior surface on the stainless steel components is recommended.~~

~~To minimize the potential for cross contamination of samples, the headspace sampling manifold and sample canisters shall be properly cleaned and leak-checked prior to each headspace gas sampling event. Procedures used for cleaning and preparing the manifold and sample canisters shall be equivalent to those provided in EPA's Compendium Method TO-14A or TO-15 (EPA 1999). Cleaning requirements are presented below.~~

~~C1-1c(1) Headspace-Gas Sample Canister Cleaning~~

~~SUMMA® or equivalent canisters used in these methods shall be subjected to a rigorous cleaning and certification procedures prior to use in the collection of any samples. Guidance for the development of this procedure has been derived from Method TO-14A or TO-15 (EPA 1999). Specific detailed instructions shall be provided in laboratory standard operating procedures (**SOPs**) for the cleaning and certification of canisters.~~

~~Canisters shall be cleaned and certified on an equipment cleaning batch basis. An equipment cleaning batch is any number of canisters cleaned together at one time using the same cleaning method. A cleaning system, capable of processing multiple canisters at a time, composed of an oven (optional) and a vacuum manifold which uses a dry vacuum pump or a cryogenic trap backed by an oil sealed pump shall be used to clean SUMMA® or equivalent canisters. Prior to cleaning, a positive or negative pressure leak test shall be performed on all canisters. The duration of the leak test must be greater than or equal to the time it takes to collect a sample, but no greater than 24 hours. For a leak test, a canister passes if the pressure does not change by a rate greater than ±2 psig per 24 hours. Any canister that fails shall be checked for leaks, repaired, and reprocessed. One canister per equipment cleaning batch shall be filled with humid zero air or humid high purity nitrogen and analyzed for VOCs. The equipment cleaning batch of canisters shall be considered clean if there are no VOCs above three times the MDLs listed in Table C3-2 of Permit Attachment C3. After the canisters have been certified for leak-tightness and found to be free of background contamination, they shall be evacuated to 0.0039 in. (0.10 mm) Hg or less for storage prior to shipment. The Permittees shall require the laboratory responsible for canister cleaning and certification to maintain canister certification documentation and initiate the canister tags as described in Permit Attachment C3.~~

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~~C1-1c(2) Sampling Equipment Initial Cleaning and Leak Check~~

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~~The surfaces of all headspace-gas sampling equipment components that will come into contact with headspace gas shall be thoroughly inspected and cleaned prior to assembly. The manifold and associated sampling heads shall be purged with humidified zero air, nitrogen, or helium, and leak checked after assembly. This cleaning shall be repeated if the manifold and/or associated sampling heads are contaminated to the extent that the routine system cleaning is inadequate.~~

~~C1-1c(3) Sampling Equipment Routine Cleaning and Leak Check~~

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~~The manifold and associated sampling heads which are reused shall be cleaned and checked for leaks in accordance with the cleaning and leak check procedures described in EPA's Compendium Method TO-14A or TO-15 (EPA 1999). The procedures shall be conducted after headspace gas and field duplicate collection; after field blank collection, after field blanks are collected through the manifold; and after the additional cleaning required for field reference standard collection has been completed. The protocol for routine manifold cleaning and leak check requires that sample canisters be attached to the canister ports, or that the ports be capped or closed by valves, and requires that the sampling head be attached to the purge assembly.~~

~~VOCs shall be removed from the internal surfaces of the headspace sampling manifold to levels that are less than or equal to three times the MDLs of the analytes listed in Table C3-2 of Permit Attachment C3, as determined by analysis of an equipment blank or through use of an OVA. It is recommended that the headspace sampling manifold be heated to 150° Centigrade and periodically evacuated and flushed with humidified zero air, nitrogen, or helium. When not in use, the manifold shall be demonstrated clean before storage with a positive pressure of high purity gas (i.e., zero air, nitrogen, or helium) in both the standard and sample sides.~~

~~Sampling shall be suspended and corrective actions shall be taken when the analysis of an equipment blank indicates that the VOC limits have been exceeded or if a leak test fails. The Permittees shall require the site project manager to ensure that corrective action has been taken prior to resumption of sampling.~~

~~C1-1c(4) Manifold Cleaning After Field Reference Standard Collection~~

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~~The sampling system shall be specially cleaned after a field reference standard has been collected, because the field reference standard gases contaminate the standard side of the headspace sampling manifold when they are regulated through the purge assembly. This cleaning requires the installation of a gas-tight connector in place of the sampling head, between the flexible hose and the purge assembly. This configuration allows both the sample and standard sides of the sampling system to be flushed (evacuated and pressurized) with humidified zero air, nitrogen, or helium which, combined with heating the pneumatic lines, should sweep and adequately clean the system's internal surfaces. After this protocol has been completed and prior to collecting another sample, the routine system cleaning and leak check (see previous section) shall also be performed.~~

~~C1-1c(5) Sampling Head Cleaning~~

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~~To prevent cross contamination, the needle, airtight fitting or airtight seal, adapters, and filter of the sampling heads shall be cleaned in accordance with the cleaning procedures described in EPA's Compendium Method TO-14A or TO-15 (EPA 1999). After sample collection, a sampling head shall be disposed of or cleaned in accordance with EPA's Compendium Method TO-14A or TO-15 (EPA1999), prior to reuse. As a further QC measure, the needle, airtight fitting or airtight seal, and filter, after cleaning, should be purged with zero air, nitrogen, or helium and capped for storage to prevent sample contamination by VOCs potentially present in ambient air.~~

~~C1-1d Equipment Calibration and Frequency~~

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~~The manifold pressure sensor shall be certified prior to initial use, then annually, using NIST traceable, or equivalent, standards. If necessary, the pressure indicated by the pressure sensor(s) shall be temperature compensated. The ambient air temperature sensor, if present, shall be certified prior to initial use, then annually, to NIST traceable, or equivalent, temperature standards.~~

~~The OVA shall be calibrated once per day, prior to first use, or as necessary according to the manufacturer's specifications. Calibration gases shall be certified to contain known analytes from Table C3-2 of Permit Attachment C3 at known concentrations. The balance of the OVA calibration gas shall be consistent with the manifold purge gas when the OVA is used (i.e., zero air, nitrogen, or helium).~~

~~C1-2 Sampling of Homogeneous Solids and Soil/Gravel (Summary Categories S3000/S4000)~~

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~~For those waste streams without an AK Sufficiency Determination approved by DOE, randomly selected containers of homogeneous solid and/or soil/gravel waste streams (S3000/S4000) shall be sampled and analyzed to resolve the assignment of EPA hazardous waste numbers. For example, analytical results may be useful to resolve uncertainty regarding hazardous constituents used in a process that generated the waste stream when the hazardous constituents are not documented in the acceptable knowledge information for the waste.~~

~~C1-2a Method Requirements~~

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~~The methods used to collect samples of transuranic (**TRU**) mixed waste, classified as homogeneous solids and soil/gravel from waste containers, shall be such that the samples are representative of the waste from which they were taken. To minimize the quantity of investigation-derived waste, laboratories conducting the analytical work may require no more sample than is required for the analysis, based on the analytical methods. However, a sufficient number of samples shall be collected to adequately represent waste being sampled. For those waste streams defined as Summary Category Groups S3000 or S4000 in Attachment C, debris that may also be present within these wastes need not be sampled.~~

~~Samples of retrievably stored waste containers will be collected using appropriate coring equipment or other EPA approved methods to collect a representative sample. Newly generated wastes that are sampled from a process as it is generated may be sampled using EPA approved methods, including scoops and ladles, that are capable of collecting a representative sample. All sampling and core sampling will comply with the QC requirements specified in C1-2b.~~

~~C1-2a(1) Core Collection~~

~~Coring tools shall be used to collect cores of homogeneous solids and soil/gravel from waste containers, when possible, in a manner that minimizes disturbance to the core. A rotational coring tool (i.e., a tool that is rotated longitudinally), similar to a drill bit, to cut, lift the waste cuttings, and collect a core from the bore hole, shall be used to collect sample cores from waste containers. For homogeneous solids and soil/gravel that are relatively soft, non-rotational coring tools may be used in lieu of a rotational coring tool.~~

~~To provide a basis for describing the requirements for core collection, diagrams of a rotational coring tool (i.e., a light weight auger) and a non-rotational coring tool (i.e., a thin-walled sampler) are provided in Figures C1-5 and C1-6, respectively.~~

~~The following requirements apply to the use of coring tools:~~

- ~~Each coring tool shall contain a removable tube (liner) that is constructed of fairly rigid material unlikely to affect the composition and/or concentrations of target analytes in the sample core. Materials that are acceptable for use for coring device sleeves are polycarbonate, teflon, or glass for most samples, and stainless steel or brass if samples are not to be analyzed for metals. The Permittees shall require site quality assurance project plans (**QAPjPs**) to document that analytes of concern are not present in liner material. The Permittees shall also require sites to document that the materials are unlikely to affect sample results through the collection and analysis of an equipment blank prior to first use as specified in the 'Equipment Blanks' section of this appendix. Liner outer diameter is recommended to be no more than 2 in. and no less than one in. Liner wall thickness is recommended to be no greater than 1/16 in. Before use, the liner shall be cleaned in accordance the requirements in Section C1-2b. The liner shall fit flush with the inner wall of the coring tool and shall be of sufficient length to hold a core that is representative of the waste along the entire depth of the waste. The depth of the waste is calculated as the distance from the top of the sludge to the bottom of the drum (based on the thickness of the liner and the rim at the bottom of the drum). The liner material shall have sufficient transparency to allow visual examination of the core after sampling. If sub-sampling is not conducted immediately after core collection and liner extrusion, then end caps constructed of material unlikely to affect the composition and/or concentrations of target analytes in the core (e.g., Teflon®) shall be placed over the ends of the liner. End caps shall fit tightly to the ends of the liner. The Permittees shall require site specific QAPjPs to indicate the acceptable materials for core liners and end caps.~~

- ~~A spring retainer, similar to that illustrated in Figures C1-5 and C1-6, shall be used with each coring tool when the physical properties of the waste are such that the waste may fall out of the coring tool's liner during sampling activities. The spring retainer shall be constructed of relatively inert material (e.g., stainless steel or Teflon®) and its inner diameter shall not be less than the inner diameter of the liner. Before use, spring retainers shall be cleaned in accordance with the requirements in Section C1-2b.~~

- ~~Coring tools may have an air-lock mechanism that opens to allow air inside the liners to escape as the tool is pressed into the waste (e.g., ball check valve). If used, this air-lock mechanism shall also close when the core is removed from the waste container.~~

- ~~After disassembling the coring tool, a device (extruder) to forcefully extrude the liner from the coring tool shall be used if the liner does not slide freely. All surfaces of the extruder that may come into contact with the core shall be cleaned in accordance with the requirements in Section C1-2(b) prior to use.~~

- ~~Coring tools shall be of sufficient length to hold the liner and shall be constructed to allow placement of the liner leading edge as close as possible to the coring tools leading edge.~~

- ~~All surfaces of the coring tool that have the potential to contact the sample core or sample media shall be cleaned in accordance with the requirements in Section C1-2(b) prior to use.~~

- ~~The leading edge of the coring tools may be sharpened and tapered to a diameter equivalent to, or slightly smaller than, the inner diameter of the liner to reduce the drag of the homogeneous solids and soil/gravel against the internal surfaces of the liner, thereby enhancing sample recovery.~~

- ~~Rotational coring tools shall have a mechanism to minimize the rotation of the liner inside the coring tool during coring activities, thereby minimizing physical disturbance to the core.~~

- ~~Rotational coring shall be conducted in a manner that minimizes transfer of frictional heat to the core, thereby minimizing potential loss of VOCs.~~

- ~~Non-rotational coring tools shall be designed such that the tool's kerf width is minimized. Kerf width is defined as one-half of the difference between the outer diameter of the tool and the inner diameter of the tool's inlet.~~

~~C1-2a(2) Sample Collection~~

~~Sampling of cores shall be conducted in accordance with the following requirements:~~

- ~~Sampling shall be conducted as soon as possible after core collection. If a substantial delay (i.e., more than 60 minutes) is expected between core collection and sampling, the core shall remain in the liner and the liner shall be capped at each end. If the liner containing the core is not extruded from the coring tool and capped, then two alternatives are permissible: 1) the liner shall be left in the coring tool and the coring tool shall be capped at each end, or 2) the coring tool shall remain in the waste container with the air-lock mechanism attached.~~

- ~~Samples of homogeneous solids and soil/gravel for VOC analyses shall be collected prior to extruding the core from the liner. These samples may be collected by collecting a single sample from the representative subsection of the core, or three sub-samples may be collected from the vertical core to form a single 15-gram composite sample. Smaller sample sizes may be used if method PRQL requirements are met for all analytes. The sampling locations shall be randomly selected. If a single sample is used, the representative subsection is chosen by randomly selecting a location along the portion of the core (i.e. core length). If the three sub-sample method is used, the~~

~~sampling locations shall be randomly selected within three equal-length subsections of the core along the long axis of the liner and access to the waste shall be gained by making a perpendicular cut through the liner and the core. The Permittees shall require sites to develop documented procedures to select, and record the selection, of random sampling locations. True random sampling involves the proper use of random numbers for identifying sampling locations. The procedures used to select the random sampling locations will be subject to review as part of annual audits by DOE. A sampling device such as the metal coring cylinder described in EPA's SW-846 Manual (1996), or equivalent, shall be immediately used to collect the sample once the core has been exposed to air. Immediately after sample collection, the sample shall be extruded into 40-ml volatile organics analysis (**VOA**) vials (or other containers specified in appropriate SW-846 methods), the top rim of the vial visually inspected and wiped clean of any waste residue, and the vial cap secured. Sample handling requirements are outlined in Table C1-4. Additional guidance for this type of sampling can be found in SW-846 (EPA 1996).~~

- ~~Samples of the homogeneous solids and soil/gravel for semi-volatile organic compound and metals analyses shall be collected. These samples may be collected from the same sub-sample locations and in the same manner as the sample collected for VOC analysis, or they may be collected by splitting or compositing the representative subsection of the core. The representative subsection is chosen by randomly selecting a location along the portion of the core (i.e. core length). The Permittees shall require sites to develop documented procedures to select, and record the selection, of random sampling locations. True random sampling involves the proper use of random numbers for identifying sampling locations. The procedures used to select the random sampling locations will be subject to review as part of annual audits by DOE. Guidance for splitting and compositing solid materials can be found in SW-846 (EPA 1996). All surfaces of the sampling tools that have the potential to come into contact with the sample shall be constructed of materials unlikely to affect the composition or concentrations of target analytes in the waste (e.g., Teflon®). In addition, all surfaces that have the potential to come into contact with core sample media shall either be disposed or decontaminated according to the procedures found in Section C1-2(b). Sample sizes and handling requirements are outlined in Table C1-4.~~

~~Newly generated waste samples may be collected using methods other than coring, as discussed in Section C1-2a. Newly generated wastes samples will be collected as soon as possible after sampling, but the spatial and temporal homogeneity of the waste stream dictate whether a representative grab sample or composite sample shall be collected. As part of the site audit, DOE shall assess waste sampling to ensure collection of representative samples.~~

~~C1-2b Quality Control~~

~~QC requirements for sampling of homogeneous solids and soil/gravel include collecting co-located samples from cores or other sample types to determine precision; equipment blanks to verify cleanliness of the sampling and coring tools and sampling equipment; and analysis of reagent blanks to ensure reagents, such as deionized or high pressure liquid chromatography (**HPLC**) water, are of sufficient quality. Coring and sampling of homogeneous solids and soil/gravel shall comply, at minimum, with the following QC requirements.~~

~~C1-2b(1) Co-located Samples~~

~~In accordance with the requirement to collect field duplicates required by the EPA methods found in SW-846 (EPA 1996), samples shall be collected to determine the combined precision of the coring and sampling procedures. The co-located core methodology is a duplicate sample collection methodology intended to collect samples from a second core placed at approximately the same location within the drum when samples are collected by coring. Waste may not be amenable to coring in some instances. In this case, a co-located sample may be collected from a sample (e.g. scoop) collected from approximately the same location in the waste stream. A sample from each co-located core or waste sample collected by other means shall be collected side by side as close as feasible to one another, handled in the same manner, visually inspected through the transparent liner (if cored), and sampled in the same manner at the same randomly selected sample location(s). If the visual examination detects inconsistencies such as color, texture, or waste type in the waste at the sample location, another sampling location may be randomly selected, or the samples may be invalidated and co-located samples or cores may again be collected. Co-located samples, from either core or other sample type, shall be collected at a frequency of one per sampling batch or once per week, whichever is more frequent. A sampling batch is a suite of homogeneous solids and soil/gravel samples collected consecutively using the same sampling equipment within a specific time period. 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.~~

~~C1-2b(2) Equipment Blanks~~

~~In accordance with SW-846 (EPA 1996), equipment blanks shall be collected from fully assembled sampling and coring tools (i.e., at least those portions of the sampling equipment that contact the sample) prior to first use after cleaning at a frequency of one per equipment cleaning batch. An equipment cleaning batch is the number of sampling equipment items cleaned together at one time using the same cleaning method. The equipment blank shall be collected from the fully assembled sampling or coring tool, in the area where the sampling or coring tools are cleaned, prior to covering with protective wrapping and storage. The equipment blank shall be collected by pouring clean water (e.g., deionized water, HPLC water) down the inside of the assembled sampling or coring tool. The water shall be collected in a clean sample container placed at the leading edge of the sampling or coring tool and analyzed for the analytes listed in Tables C3-4, C3-6, and C3-8 of Permit Attachment C3. The results of the equipment blank will be considered acceptable if the analysis indicates no analyte at a concentration greater than three times the MDLs listed in Tables C3-4 and C3-6 or in the Program Required Detection Limits (**PRDL**) in Table C3-8 of Permit Attachment C3. If analytes are detected at concentrations greater than three times the MDLs (or PRDLs for metals), then the associated equipment cleaning batch of sampling or coring tools shall be cleaned again and another equipment blank collected. Equipment from an equipment cleaning batch may not be used until analytical results have been received verifying an adequately low level of contamination in the equipment blank.~~

~~Equipment blanks for coring tools shall be collected from liners that are cleaned separately from the coring tools. These equipment blanks shall be collected at a frequency of one per equipment cleaning batch. The equipment blanks shall be collected by randomly selecting a liner from the equipment cleaning batch, pouring clean water (e.g., deionized water or HPLC water) across its internal surface, collecting the water in a clean sample container, and analyzing the water for the analytes listed in Tables C3-4, C3-6, and the PRDLs in Table C3-8 of Permit Attachment~~

~~C3. The results of the equipment blank analysis will be considered acceptable if the results indicate no analyte at a concentration greater than three times the MDLs listed in Tables C3-4, C3-6, or C3-8 of Permit Attachment C3. If analytes are detected at concentrations greater than three times the MDLs (or PRDLs for metals), then the associated equipment cleaning batch of liners shall be cleaned again and another equipment blank collected. Equipment from an equipment cleaning batch may not be used until analytical results have been received verifying an adequately low level of contamination in the equipment blank.~~

~~Sampling equipment (e.g., bowls, spoons, chisel, VOC sub-sampler) shall also be cleaned. Equipment blanks shall be collected for the sampling equipment at a frequency of one per equipment cleaning batch. After the sampling equipment has been cleaned, one item from the equipment cleaning batch is randomly selected, water (e.g., deionized water, HPLC water) is passed over its surface, collected in a clean container, and analyzed for the analytes listed in Tables C3-4, C3-6, and C3-8 of Permit Attachment C3. The results of the equipment blank will be considered acceptable if the results indicate no analyte present at a concentration greater than three times the MDLs listed in Tables C3-4 and C3-6 and in the PRDLs in C3-8 of Permit Attachment C3. If analytes are detected at concentrations greater than three times the MDLs (or PRDLs for metals), then the associated equipment cleaning batch of sampling equipment shall be cleaned again and another equipment blank collected. Equipment from an equipment cleaning batch may not be used until analytical results have been received verifying an adequately low level of contamination in the equipment blank. The above equipment blanks may be performed on a purchased batch basis for sampling equipment purchased sterile and sealed in protective packaging. Equipment blanks need not be performed for equipment purchased in sealed protective packaging accompanied by a certificate certifying cleanliness.~~

~~The results of equipment blanks shall be traceable to the items in the equipment cleaning batch that the equipment blank represents. All sampling items should be identified, and the associated equipment cleaning batch should be documented. The method of documenting the connection between equipment and equipment cleaning batches shall be documented. Equipment blank results for the coring tools, liners, and sampling equipment shall be reviewed prior to use. A sufficient quantity of these items should be maintained in storage to prevent disruption of sampling operations.~~

~~The Permittees may require a site to use certified clean disposable sampling equipment and discard liners and sampling tools after one use. In this instance, cleaning and equipment blank collection is not required.~~

~~C1-2b(3) Coring Tool and Sampling Equipment Cleaning~~

~~Coring tools and sampling equipment shall be cleaned in accordance with the following requirements:~~

- ~~All surfaces of coring tools and sampling equipment that will come into contact with the samples shall be clean prior to use. All sampling equipment shall be cleaned in the same manner. Immediately following cleaning, coring tools and sampling equipment shall be assembled and sealed inside clean protective wrapping.~~

- ~~Each reusable sampling or coring tool shall have a unique identification number. Each number shall be referenced to the waste container on which it was used. This information shall be recorded in the field records. One sampling or coring tool from~~

~~each equipment cleaning batch shall be tested for cleanliness in accordance with the requirements specified above. The identification number of the sampling or coring tool from which the equipment blank was collected shall be recorded in the field records. The results of the equipment blank analysis for the equipment cleaning batch in which each sampling or coring tool was cleaned shall be submitted to the sampling facility with the identification numbers of all sampling or coring tools in the equipment cleaning batch. If analytes are detected at concentrations greater than three times the MDLs (or PRDLs for metals), then the associated equipment cleaning batch of sampling equipment shall be cleaned again and another equipment blank collected. Equipment from an equipment cleaning batch may not be used until analytical results have been received verifying an adequately low level of contamination in the equipment blank.~~

- ~~Sample containers shall be cleaned in accordance with SW-846 (EPA 1996).~~

~~C1-2c Equipment Testing, Inspection and Maintenance~~

~~Prior to initiation of sampling or coring activities, sampling and coring tools shall be tested in accordance with manufacturer specifications to ensure operation within the manufacturer's tolerance limits. Other specifications specific to the sampling operations (e.g., operation of containment structure and safety systems) should also be tested and verified as operating properly prior to initiating coring activities. Coring tools shall be assembled, including liners, and tested. Air-lock mechanisms and rotation mechanisms shall be inspected for free movement of critical parts. Sampling and coring tools found to be malfunctioning shall be repaired or replaced prior to use.~~

~~Coring tools and sample collection equipment shall be maintained in accordance with manufacturer's specifications. Clean sampling and coring tools and sampling equipment shall be sealed inside clean protective wrapping and maintained in a clean storage area prior to use. Sampling equipment shall be properly maintained to avoid contamination. A sufficient supply of spare parts should be maintained to prevent delays in sampling activities due to equipment down time. Records of equipment maintenance and repair shall be maintained in the field records in accordance with site SOPs.~~

~~Inspection of sampling equipment and work areas shall include the following:~~

- ~~Sample collection equipment in the immediate area of sample collection shall be inspected daily for cleanliness. Visible contamination on any equipment (e.g., waste on floor of sampling area, hydraulic fluid from hoses) that has the potential to contaminate a waste core or waste sample shall be thoroughly cleaned upon its discovery.~~

- ~~The waste coring and sampling work areas shall be maintained in clean condition to minimize the potential for cross contamination between waste (including cores) and samples.~~

- ~~Expendable equipment (e.g., plastic sheeting, plastic gloves) shall be visually inspected for cleanliness prior to use and properly discarded after each sample.~~

- ~~Prior to removal of the protective wrapping from a coring tool designated for use, the condition of the protective wrapping shall be visually assessed. Coring tools with torn protective wrapping should be returned for cleaning. Coring tools visibly contaminated~~

~~after the protective wrapping has been removed shall not be used and shall be returned for cleaning or properly discarded.~~

- ~~Sampling equipment shall be visually inspected prior to use. All sampling equipment that comes into contact with waste samples shall be stored in protective wrapping until use. Prior to removal of the protective wrapping from sampling equipment, the condition of the protective wrapping shall be visually assessed. Sampling equipment with torn protective wrapping should be discarded or returned for cleaning. Sampling equipment visibly contaminated after the protective wrapping has been removed shall not be used and shall be returned for cleaning or properly discarded.~~

- ~~Cleaned sampling and coring equipment will be physically segregated from all equipment that has been used for a sampling event and has not been decontaminated.~~

~~C1-2d Equipment Calibration and Frequency~~

~~The scale used for weighing sub-samples shall be calibrated as necessary to maintain its operation within manufacturer's specification, and after repairs and routine maintenance. Weights used for calibration shall be traceable to a nationally recognized standard. Calibration records shall be maintained in the field records.~~

C1-~~3~~1 Radiography

Radiography has been developed by the Permittees specifically to aid in the examination and identification of containerized waste. The Permittees shall require that sites describe all activities required to achieve the radiography objectives in site QAPjPs and SOPs. These SOPs should include instructions specific to the radiography system(s) used at the site. For example, to detect liquids, some systems require the container to be rotated back and forth while other systems require the container to be tilted.

A radiography system (e.g., real time radiography, digital radiography/computed tomography) normally consists of an X-ray-producing device, an imaging system, an enclosure for radiation protection, a waste container handling system, an audio/video recording system, and an operator control and data acquisition station. Although these six components are required, it is expected there will be some variation within a given component between sites. The radiography system shall have controls or an equivalent process which allow the operator to control image quality. On some radiography systems, it should be possible to vary the voltage, typically between 150 to 400 kilovolts (**kV**), to provide an optimum degree of penetration through the waste. For example, high-density material should be examined with the X-ray device set on the maximum voltage. This ensures maximum penetration through the waste container. Low-density material should be examined at lower voltage settings to improve contrast and image definition. The imaging system typically utilizes either a fluorescent screen and a low-light television camera or x-ray detectors to generate the image.

To perform radiography, the waste container is scanned while the operator views the television screen. A video and audio recording is made of the waste container scan and is maintained as a non-permanent record. A radiography data form is also used to document the Waste Matrix Code to ensure that the waste container contains no ignitable, corrosive, or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and verify that the physical form of the waste is consistent with the waste stream description

documented in the AK Summary. Containers whose contents prevent full examination of the remaining contents shall be subject to visual examination unless the site certifies that visual examination would provide no additional relevant information for that container based on the acceptable knowledge information for the waste stream. Such certification shall be documented in the generator/storage site's record.

For containers which contain classified shapes and undergo radiography, the radiography video and audio recording will be considered classified. The radiography data forms will not contain classified information.

The radiography system involves qualitative and semiquantitative evaluations of visual displays. Operator training and experience are the most important considerations for ensuring quality controls in regard to the operation of the radiography system and for interpretation and disposition of radiography results. Only trained personnel shall be allowed to operate radiography equipment.

Standardized training requirements for radiography operators shall be based upon existing industry standard training requirements.

The Permittees shall require each site to develop a training program that provides radiography operators with both formal and on-the-job (**OJT**) training. Radiography operators shall be instructed in the specific waste generating practices, typical packaging configurations, and associated waste material parameters expected to be found in each Waste Matrix Code at the site. The OJT and apprenticeship shall be conducted by an experienced, qualified radiography operator prior to qualification of the training candidate. The training programs will be site-specific due to differences in equipment, waste configurations, and the level of waste characterization efforts. For example, certain sites use digital radiography equipment, which is more sensitive than real-time radiography equipment. In addition, the particular physical forms and packaging configurations at each site will vary; therefore, radiography operators shall be trained on the types of waste that are generated, stored, and/or characterized at that particular site.

Although the Permittees shall require each site to develop its own training program, all of the radiography QC requirements specified in this WAP shall be incorporated into the training programs and radiography operations. In this way data quality and comparability will not be affected.

Radiography training programs will be the subject of the Audit and Surveillance Program (Permit Attachment C6).

One or more training containers with items (including prohibited items) common to the waste streams to be characterized and internal containers of various sizes shall be scanned semiannually by each operator. The audio and video media shall then be reviewed by a supervisor to ensure that operators' interpretations remain consistent and accurate. Imaging system characteristics shall be verified on a routine basis.

Independent replicate scans and replicate observations of the video output of the radiography process shall be performed under uniform conditions and procedures. Independent replicate scans shall be performed on one waste container per day or once per testing batch, whichever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container. Independent observations of one scan (not the replicate scan) shall also be

made once per day or once per testing batch, whichever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container. A testing batch is a suite of waste containers undergoing radiography using the same testing equipment. A testing batch can be up to 20 waste containers without regard to waste matrix.

Oversight functions include periodic audio/video media reviews of accepted waste containers and shall be performed by qualified radiography operators that were not involved in the original scans of the waste containers. The results of this independent verification shall be available to the radiography operators who performed the original scans. The Permittees shall require the site project manager to be responsible for monitoring the quality of the radiography data and calling for corrective action, when necessary.

C1-~~4~~2 Visual Examination

The waste container contents may be verified directly by visual examination (**VE**) of the waste container contents. Visual examination may be performed by physically examining the contents of waste containers to verify the Waste Matrix Code and to verify that the container is properly included in the appropriate waste stream. Visual examination shall be conducted on a waste container to identify and describe all waste items, packaging materials, and waste material parameters in the waste container. Visual examination activities shall be documented on video/audio media, or by using a second operator to provide additional verification by reviewing the contents of the waste container to ensure correct reporting. When VE is performed using a second operator, each operator performing the VE shall observe for themselves the waste being placed in the waste container or the contents within the examined waste container when waste is not removed. The results of all VE shall be documented on VE data forms, which are used to document the Waste Matrix Code, ensure that the waste container contains no ignitable, corrosive, or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and verify that the physical form of the waste is consistent with the waste stream description documented in the AK Summary.

Visual examination recorded on video/audio media shall meet the following minimum requirements:

- The video/audio media shall record the waste packaging event for the container such that all waste items placed into the container are recorded in sufficient detail and shall contain an inventory of waste items in sufficient detail that another trained VE operator can identify the associated waste material parameters.
- The video/audio media shall capture the waste container identification number.
- The personnel loading the waste container shall be identified on the video/audio media or on packaging records traceable to the loading of the waste container.
- The date of loading of the waste container will be recorded on the video/audio media or on packaging records traceable to the loading of the waste container.

Visual examination performed using two generator site personnel shall meet the following minimum requirements:

- At least two generator site personnel who witnessed the packaging of the waste shall approve the data forms or packaging records attesting to the contents of the waste container.

- The data forms or packaging records shall contain an inventory of waste items in sufficient detail that another trained VE operator can identify the associated waste material parameters.

- The waste container identification number shall be recorded on the data forms or packaging records.

Visual examination video/audio media of containers which contain classified shapes shall be considered classified information. Visual examination data forms or packaging records will not contain classified information.

Waste container packaging records may be used to meet the VE data quality objectives (**DQOs**) (Permit Attachment C, Section C-4a(1)). These records must meet the minimum requirements listed above for either VE recorded on video/audio media or VE performed by two generator/storage site personnel, and shall be reviewed by operators trained and qualified to the requirements listed below. The operators will prepare data forms based on the visual examination records. Visual examination batch data reports will be prepared, reviewed, and approved as described in Permit Attachment C, Section C-4, and Permit Attachment C3.

Standardized training for VE shall be developed. Visual examination operators shall be instructed in the specific waste generating processes, typical packaging configurations, and waste material parameters expected to be found in each Waste Matrix Code at the site. The training shall be site specific to include the various waste configurations generated/stored at the site. For example, the particular physical forms and packaging configurations at each site will vary so operators shall be trained to examine the types of waste that are generated, stored, and/or characterized at that particular site. Training will include the following regardless of Summary Category Group:

- Identifying and describing the contents of a waste container by examining all items in waste containers of previously packaged waste

- Identifying when VE cannot be used to meet the DQOs

Visual examination personnel shall be requalified once every two years.

Each VE facility shall designate a VE expert. The VE expert shall be familiar with the waste generating processes that have taken place at that site and also be familiar with all of the types of waste being characterized at that site. The VE expert shall be responsible for the overall direction and implementation of the VE at that facility. The Permittees shall require site QAPjPs to specify the selection, qualification, and training requirements of the VE expert.

~~C1-5 Custody of Samples~~

~~Chain-of-Custody on field samples (including field QC samples) will be initiated immediately after sample collection or preparation. Sample custody will be maintained by ensuring that samples are custody sealed during shipment to the laboratory. After samples are accepted by~~

~~the analytical laboratory, custody is maintained by assuring the samples are in the possession of an authorized individual, in that individual's view, in a sealed or locked container controlled by that individual, or in a secure controlled access location. Sample custody will be maintained until the sample is released by the site project manager or until the sample is expended. The Permittees shall require that site QAPjPs or site-specific procedures include a copy of the sample chain-of-custody form and instructions for completing sample chain-of-custody forms in a legally defensible manner. This form will include provisions for each of the following:~~

- ~~Signature of individual initiating custody control, along with the date and time.~~
- ~~Documentation of sample numbers for each sample under custody. Sample numbers will be referenced to a specific sampling event description that will identify the sampler(s) through signature, the date and time of sample collection, type/number containers for each sample, sample matrix, preservatives (if applicable), requested methods of analysis, place/address of sample collection and the waste container number.~~
- ~~For off-site shipping, method of shipping transfer, responsible shipping organization or corporation, and associated air bill or lading number.~~
- ~~Signatures of custodians relinquishing and receiving custody, along with date and time of the transfer.~~
- ~~Description of final sample container disposition, along with signature of individual removing sample container from custody.~~
- ~~Comment section.~~
- ~~Documentation of discrepancies, breakage or tampering.~~

~~All samples and sampling equipment will be identified with unique identification numbers. Sampling Coring tools and equipment will be identified with unique equipment numbers to ensure that all sampling equipment, coring tools, and sampling canisters are traceable to equipment cleaning batches.~~

~~All samples will be uniquely identified to ensure the integrity of the sample and can be used to identify the generator/storage site and date of collection. Sample tags or labels will be affixed to all samples and will identify at a minimum:~~

- ~~Sample ID number~~
- ~~Sampler initials and organization~~
- ~~Ambient temperature and pressure (for gas samples only)~~
- ~~Sample description~~
- ~~Requested analyses~~
- ~~Data and time of collection~~
- ~~QC designation (if applicable)~~

~~C1-6 Sample Packing and Shipping~~

~~In the event that the analytical facilities are not at the generator/storage site, the samples shall be packaged and shipped to an off-site laboratory. Sample containers shall be packed to prevent any damage to the sampling container and maintain the preservation temperature, if necessary. Department of Transportation (**DOT**) regulations shall be adhered to for shipment of the package.~~

~~When preparing SUMMA® or equivalent canisters for shipment, special care shall be taken with the pressure gauge and the associated connections. Metal boxes which have separate compartments, or cardboard boxes with foam inserts are standard shipping containers. The chosen shipping container shall meet selected DOT regulations. If temperatures shall be maintained, an adequate number of cold packs necessary to maintain the preservation temperature shall be added to the package.~~

~~Glass jars are wrapped in bubble wrap or another type of protection. The wrapped jar should be placed in a plastic bag inside of the shipping container, so that if the jar breaks, the inside of the shipping container and the other samples will not be contaminated. The plastic bag will enable the receiving analytical lab to prevent contamination of their shipping and receiving area. Plastic jars do not present a problem for shipping purposes. All shipping containers will contain appropriate blank samples to detect any VOC cross-contamination. A DOT approved cooler, or similar package may be used as the shipping container. If temperatures must be maintained, an adequate number of cold packs necessary to maintain the preservation temperature shall be added to the package. If fill material is needed, compatibility between the samples and the fill should be evaluated prior to use.~~

~~All sample containers should be affixed with signed tamper-proof seals or devices so that it is apparent if the sample integrity has been compromised and that the identity of the seal or device is traceable to the individual who affixed the seal. A seal should also be placed on the outside of the shipping container for the same reason. Sample custody documentation shall be placed inside the sealed or locked shipping container, with the current custodian signing to release custody. Transfer of custody is completed when the receiving custodian opens the shipping container and signs the custody documentation. The shipping documentation will serve to track the physical transfer of samples between the two custodians.~~

~~A Uniform Hazardous Waste Manifest is not required, since samples are exempted from the definition of hazardous waste under RCRA. All other shipping documentation specified in the site specific SOP for sample shipment (i.e., bill of lading, site-specific shipping documentation) is required.~~

~~C1-7 List of References~~

~~Bechtel BWXT Idaho, LLC (BWXT), 2000, Determination of Drum Age Criteria and Prediction Factors Based on Packaging Configurations, INEEL/EXT-2000-01207, October 2000, Liekhus, K.J., S.M. Djordjevic, M. Devarakonda, and M.J. Connolly, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho.~~

~~Lockheed Idaho Technologies Company, 1995, Position for Determining Gas Phase Volatile Organic Compound Concentrations in Transuranic Waste Containers, INEL-95/0109/Revision 1, M.J. Connolly, et. al.~~

~~U.S. Environmental Protection Agency (EPA), 1999, Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air (EPA/625/R-96/10b, January 1999).~~

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

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# ~~TABLES~~

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~~Table C1-1~~
~~Gas Sample Requirements~~

| ~~Parameter~~ | ~~Container~~ [a] | ~~Minimum Drum Headspace Sample Volume~~ [b] | ~~Holding Temperatures~~ |
|---|---|---|---|
| ~~VOCs~~ | ~~SUMMA® Canister~~ | ~~250 ml~~ | ~~0-40 °C~~ |

~~[a] Alternately, canisters that meet QAOs may be used.~~

~~[b] Alternatively, if available headspace is limited, a single 100 ml sample may be collected for determination of VOCs.~~

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~~Table C1-2~~
~~Summary of Drum Field QC Headspace Sample Frequencies~~

| ~~QC Samples~~ | ~~Manifold~~ | ~~Direct Canister~~ | ~~On-Line Systems~~ |
|---|---|---|---|
| ~~Field blanks~~ [a] | ~~1 per sampling batch~~ [d] | ~~1 per sampling batch~~ [d] | ~~1 per on-line batch~~ [f] |
| ~~Equipment blanks~~ [b] | ~~1 per sampling batch~~ [d] | ~~once~~ [e] | ~~1 per on-line batch~~ [f] |
| ~~Field reference standards~~ [c] | ~~1 per sampling batch~~ [d] | ~~once~~ [e] | ~~1 per on-line batch~~ [f] |
| ~~Field duplicates~~ | ~~1 per sampling batch~~ [d] | ~~1 per sampling batch~~ [d] | ~~1 per on-line batch~~ [f] |

~~[a] Analysis of field blanks for VOCs (Table C3-2 of Attachment C3), only, is required. For on-line integrated sampling/analysis systems, if field blank results meet the acceptance criterion, a separate on-line blank is not required.~~

~~[b] One equipment blank or on-line sample shall be collected, analyzed for VOCs (Table C3-2), and demonstrated clean prior to first use of the headspace gas sampling equipment with each of the sampling heads, then at the specified frequency, for VOCs only thereafter. Daily, prior to work, the sampling manifold, if in use, shall be verified clean using an OVA.~~

~~[c] One field reference standard or on-line control sample shall be collected, analyzed, and demonstrated to meet the QAOs specified in Permit Attachment C3 prior to first use, then at the specified frequency thereafter.~~

~~[d] A sampling batch is a suite of samples collected consecutively using the same sampling equipment within a specific time period. 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.~~

~~[e] One equipment blank and field reference standard shall be collected after equipment purchase, cleaning, and assembly.~~

~~[f] An on-line batch is the number of samples collected within a 12-hour period using the same on-line integrated sampling/analysis system. The analytical batch requirements are specified by the analytical method being used in the on-line system.~~

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~~Table C1-3~~
~~Summary of Sampling Quality Control Sample Acceptance Criteria~~

| ~~QC Sample~~ | ~~Acceptance Criteria~~ | ~~Corrective Action~~ [a] |
|---|---|---|
| ~~Field blanks~~ | ~~VOC amounts ≤ 3 × MDLs in Table C3-2 for GC/MS and GC/FID;~~<br><br>~~< PRQLs in Table C3-2 for FTIRS~~ | ~~Nonconformance if any VOC amount > 3 × MDLs in Table C3-2 for GC/MS and GC/FID;~~<br><br>~~≥ PRQLs in Table C3-2 for FTIRS~~ |
| ~~Equipment blanks~~ | ~~VOC amounts ≤ 3 × MDLs in Table C3-2 of for GC/MS and GC/FID;~~<br><br>~~< PRQLs in Table C3-2 for FTIRS~~ | ~~Nonconformance if any analyte amount > 3 × MDLs in Table C3-2 for GC/MS and GC/FID;~~<br><br>~~≥ PRQLs in Table C3-2 for FTIRS~~ |
| ~~Field reference standards or on-line control sample~~ | ~~70 - 130 %R~~ | ~~Nonconformance if %R < 70 or > 130~~ |
| ~~Field duplicates or on-line duplicate~~ | ~~RPD ≤ 25~~ | ~~Nonconformance if RPD > 25~~ |

~~[a] Corrective action is only required if the final reported QC sample results do not meet the acceptance criteria.~~

~~MDL = Method detection limit~~

~~%R = Percent recovery~~

~~RPD = Relative percent difference~~

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~~Table C1-4~~
~~Sample Handling Requirements for Homogeneous Solids and Soil/Gravel~~

| ~~Parameter~~ | ~~Suggested Quantity[a]~~ | ~~Required Preservative~~ | ~~Suggested Container~~ | ~~Maximum Holding Time[b]~~ |
|---|---|---|---|---|
| ~~VOCs~~ | ~~15 grams~~ | ~~Cool to 4°C~~ | ~~Glass Vial[c]~~ | ~~14 Days Prep/ 40 Days Analyze[d]~~ |
| ~~SVOCs~~ | ~~50 grams~~ | ~~Cool to 4°C~~ | ~~Glass Jar[e]~~ | ~~14 Days Prep/ 40 Days Analyze[d]~~ |
| ~~Metals~~ | ~~10 grams~~ | ~~Cool to 4°C~~ | ~~Plastic Jar[f]~~ | ~~180 Days[g]~~ |

~~[a] Quantity may be increased or decreased according to the requirements of the analytical laboratory, as long as the QAOs are met.~~

~~[b] Holding time begins at sample collection (holding times are consistent with SW-846 requirements).~~

~~[c] 40-ml VOA vial or other appropriate containers shall have an airtight cap.~~

~~[d] 40-day holding time allowable only for methanol extract - 14-day holding time for non-extracted VOCs.~~

~~[e] Appropriate containers should be used and should have Teflon® lined caps.~~

~~[f] Polyethylene or polypropylene preferred, glass jar is allowable.~~

~~[g] Holding time for mercury analysis is 28 days.~~

~~Note: Preservation requirements in the most recent version of SW-846 may be used if appropriate.~~

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~~Table C1-5~~
~~Headspace Gas Drum Age Criteria Sampling Scenarios~~

| ~~Scenario~~ | ~~Description~~ |
|---|---|
| ~~1~~ | ~~A. Unvented 55-gallon drums without rigid poly liners are sampled through the drum lid at the time of venting.~~<br><br>~~B1. Unvented 55-gallon drums with unvented rigid poly liners are sampled through the rigid poly liner at the time of venting or prior to venting.~~<br><br>~~B2. Vented 55-gallon drums with unvented rigid poly liners are sampled through the rigid poly liner at the time of venting or prior to venting.~~<br><br>~~C. Unvented 55-gallon drums with vented rigid poly liners are sampled through the drum lid at the time of venting.~~ |
| ~~2~~ | ~~55-gallon drums that have met the criteria for Scenario 1 and then are vented, but not sampled at the time of venting.~~ [a] |
| ~~3~~ | ~~Containers (i.e., 55-gallon drums, 85-gallon drums, 100-gallon drums, SWBs, TDOPs, SLB2s and pipe components) that are initially packaged in a vented condition and sampled in the container headspace and containers that are not sampled under Scenario 1 or 2.~~ |

~~[a] Containers that have not met the Scenario 1 DAC at the time of venting must be categorized under Scenario 3. This requires the additional information required of each container in Scenario 3 (i.e., determination of packaging configuration), and such containers can only be sampled after meeting the appropriate Scenario 3 DAC.~~

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~~**Table C1-6**~~
~~**Scenario 1 Drum Age Criteria (in days) Matrix**~~

| ~~**Summary Category Group**~~ | ~~**DAC (Days)**~~ |
|---|---|
| ~~**S5000**~~ | ~~**53**~~ |

~~**Note: Containers that are sampled using the Scenario 1 DAC do not require information on the packaging configuration because the Scenario 1 DAC are based on a bounding packaging configuration. In addition, information on the rigid liner vent hole presence and diameter do not apply to containers that are sampled using the Scenario 1 DAC because they are unvented prior to sampling.**~~

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~~Table C1-7~~
~~Scenario 2 Drum Age Criteria (in days) Matrix~~

| | ~~Summary Category Group S5000~~ | | | |
|---|---|---|---|---|
| ~~Filter $H_2$ Diffusivity~~[a] | ~~Rigid Liner Vent Hole Diameter (in)~~[b] | | | |
| ~~(mol/s/mod fraction)~~ | ~~0.30~~ | ~~0.375~~ | ~~0.75~~ | ~~1.0~~ |
| ~~$1.9 \times 10^{-6}$~~ | ~~29~~ | ~~22~~ | ~~13~~ | ~~12~~ |
| ~~$3.7 \times 10^{-6}$~~ | ~~25~~ | ~~20~~ | ~~12~~ | ~~11~~ |
| ~~$3.7 \times 10^{-5}$~~ | ~~7~~ | ~~6~~ | ~~6~~ | ~~4~~ |

~~[a] The documented filter $H_2$ diffusivity must be greater than or equal to the listed value to use the DAC for the listed filter $H_2$ diffusivity (e.g., a container with a filter $H_2$ diffusivity of $4.2 \times 10^{-6}$ must use a DAC for a filter with a $3.7 \times 10^{-6}$ filter $H_2$ diffusivity). If a filter $H_2$ diffusivity for a container is undocumented or unknown or is less than $1.9 \times 10^{-6}$ filter $H_2$ diffusivity, a filter of known $H_2$ diffusivity that is greater than or equal to $1.9 \times 10^{-6}$ filter $H_2$ diffusivity must be installed prior to initiation of the relevant DAC period.~~

~~[b] The documented rigid liner vent hole diameter must be greater than or equal to the listed value to use the DAC for the listed rigid liner vent hole diameter (e.g., a container with a rigid liner vent hole of 0.5 in. must use a DAC for a rigid liner vent hole of 0.375 in.). If the rigid liner vent hole diameter for a container is undocumented during packaging (Attachment C, Section C-3d(1)), repackaging (Attachment C, Section C-3d(1)), and/or venting (Section C1-1a[4][ii]), that container must use a DAC for a rigid liner vent hole diameter of 0.30 in.~~

~~Note: Containers that are sampled using the Scenario 2 DAC do not require information on the packaging configuration because the Scenario 2 DAC are based on a bounding packaging configuration.~~

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~~Table C1-8~~
~~Scenario 3 Packaging Configuration Groups~~

| ~~Packaging Configuration Group~~ | ~~Covered S5000 Packaging Configuration Groups~~ |
|---|---|
| ~~Packaging Configuration Group 1, 55-gal drums~~[a] | ~~No layers of confinement, filtered inner lid~~[b]<br>~~No inner bags, no liner bags (bounding case)~~ |
| ~~Packaging Configuration Group 2, 55-gal drums~~[a] | ~~1 inner bag~~<br>~~1 filtered inner bag~~<br>~~1 liner bag~~<br>~~1 filtered liner bag~~<br>~~1 inner bag, 1 liner bag~~<br>~~1 filtered inner bag, 1 filtered liner bag~~<br>~~2 inner bags~~<br>~~2 filtered inner bags~~<br>~~2 inner bags, 1 liner bag~~<br>~~2 filtered inner bags, 1 filtered liner bag~~<br>~~3 inner bags~~<br>~~3 filtered inner bags~~<br>~~3 filtered inner bags, 1 filtered liner bag~~<br>~~3 inner bags, 1 liner bag (bounding case)~~ |

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| ~~Packaging Configuration Group~~ | ~~Covered S5000 Packaging Configuration Groups~~ |
|---|---|
| ~~Packaging Configuration Group 3, 55-gal drums and shielded containers~~[a] | ~~2 liner bags~~<br>~~2 filtered liner bags~~<br>~~1 inner bag, 2 liner bags~~<br>~~1 filtered inner bag, 2 filtered liner bags~~<br>~~2 inner bags, 2 liner bags~~<br>~~2 filtered inner bags, 2 filtered liner bags~~<br>~~3 filtered inner bags, 2 filtered liner bags~~<br>~~4 inner bags~~<br>~~3 inner bags, 2 liner bags~~<br>~~4 inner bags, 2 liner bags (bounding case)~~ |
| ~~Packaging Configuration Group 4, pipe components~~ | ~~No layers of confinement inside a pipe component~~<br>~~1 filtered inner bag, 1 filtered metal can inside a pipe component~~<br>~~2 inner bags inside a pipe component~~<br>~~2 filtered inner bags inside a pipe component~~<br>~~2 filtered inner bags, 1 filtered metal can inside a pipe component~~<br>~~2 inner bags, 1 filtered metal can inside a pipe component (bounding case)~~ |
| ~~Packaging Configuration Group 5, Standard Waste Box, Ten-Drum Overpack, or Standard Large Box 2~~[a] | ~~No layers of confinement~~<br>~~1 SWB liner bag (bounding case)~~ |
| ~~Packaging Configuration Group 6, Standard Waste Box, Ten-Drum Overpack, or Standard Large Box 2~~[a] | ~~any combination of inner and/or liner bags that is less than or equal to 6~~<br>~~5 inner bags, 1 SWB liner bag (bounding case)~~ |

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| ~~Packaging Configuration Group~~ | ~~Covered S5000 Packaging Configuration Groups~~ |
|---|---|
| ~~Packaging Configuration Group 7, 85-gal. drums and 100-gal. drums~~[a] | ~~• No inner bags, no liner bags, no rigid liner, filtered inner lid (bounding case)~~[b]<br>~~• No inner bags, no liner bags, no rigid liner~~ |
| ~~Packaging Configuration Group 8, 85-gal. drums and 100-gal. drums~~[a] | ~~• 4 inner bags and 2 liner bags, no rigid liner, filtered inner lid (bounding case)~~[b] |

~~[a] If a specific Packaging Configuration Groups cannot be determined based on the data collected during packaging and/or repackaging, a conservative default Packaging Configuration Group of 3 for 55-gallon drums and shielded containers, 6 for SWBs, TDOPs, and SLB2s, and 8 for 85-gallon and 100-gallon drums must be assigned provided the drums do not contain pipe component packaging. If pipe components are present as packaging in the drums, the pipe components must be sampled following the requirements for Packaging Configuration Group 4.~~

~~[b] A "filtered inner lid" is the inner lid on a double lid drum that contains a filter.~~

~~**Definitions:**~~

~~**Liner Bags: One or more optional plastic bags that are used to control radiological contamination. Liner bags for drums have a thickness of approximately 11 mils. Liner bags are typically similar in size to the container. SWB liner bags have a thickness of approximately 14 mils. TDOPs and SLB2s use SWB liner bags.**~~

~~**Inner Bags: One or more optional plastic bags that are used to control radiological contamination. Inner bags have a thickness of approximately 5 mils and are typically smaller than liner bags.**~~

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~~Table C1-9~~
~~Scenario 3 Drum Age Criteria (In Days) Matrix for S5000 Waste by Packaging Configuration Group~~

| ~~Packaging Configuration Group 1~~ | | | | | | |
|---|---|---|---|---|---|---|
| ~~Filter $H_2$ Diffusivity[a] (mol/s/mol fraction)~~ | ~~Rigid Liner Vent Hole Diameter[b]~~ | | | | | |
| | ~~0.3-inch Diameter Hole~~ | ~~0.375-inch Diameter Hole~~ | ~~0.75-inch Diameter Hole~~ | ~~1-inch Diameter Hole~~ | ~~No Liner Lid~~ | ~~No Liner~~ |
| ~~$1.9 \times 10^{-6}$~~ | ~~131~~ | ~~95~~ | ~~37~~ | ~~24~~ | ~~4~~ | ~~4~~ |
| ~~$3.7 \times 10^{-6}$~~ | ~~111~~ | ~~85~~ | ~~36~~ | ~~24~~ | ~~4~~ | ~~4~~ |
| ~~$3.7 \times 10^{-5}$~~ | ~~28~~ | ~~28~~ | ~~23~~ | ~~19~~ | ~~4~~ | ~~4~~ |
| ~~Packaging Configuration Group 2~~ | | | | | | |
| ~~Filter $H_2$ Diffusivity[a] (mol/s/mol fraction)~~ | ~~Rigid Liner Vent Hole Diameter[b]~~ | | | | | |
| | ~~0.3-inch Diameter Hole~~ | ~~0.375-inch Diameter Hole~~ | ~~0.75-inch Diameter Hole~~ | ~~1-inch Diameter Hole~~ | ~~No Liner Lid~~ | ~~No Liner~~ |
| ~~$1.9 \times 10^{-6}$~~ | ~~175~~ | ~~138~~ | ~~75~~ | ~~60~~ | ~~30~~ | ~~11~~ |
| ~~$3.7 \times 10^{-6}$~~ | ~~152~~ | ~~126~~ | ~~73~~ | ~~59~~ | ~~30~~ | ~~11~~ |
| ~~$3.7 \times 10^{-5}$~~ | ~~58~~ | ~~57~~ | ~~52~~ | ~~47~~ | ~~28~~ | ~~8~~ |
| ~~Packaging Configuration Group 3~~ | | | | | | |
| ~~Filter $H_2$ Diffusivity[a] (mol/s/mol fraction)~~ | ~~Rigid Liner Vent Hole Diameter[b]~~ | | | | | |
| | ~~0.3-inch Diameter Hole~~ | ~~0.375-inch Diameter Hole~~ | ~~0.75-inch Diameter Hole~~ | ~~1-inch Diameter Hole~~ | ~~No Liner Lid~~ | ~~No Liner~~ |
| ~~$1.9 \times 10^{-6}$~~ | ~~199~~ | ~~161~~ | ~~96~~ | ~~80~~ | ~~46~~ | ~~16~~ |
| ~~$3.7 \times 10^{-6}$~~ | ~~175~~ | ~~148~~ | ~~93~~ | ~~79~~ | ~~46~~ | ~~16~~ |
| ~~$3.7 \times 10^{-5}$~~ | ~~72~~ | ~~72~~ | ~~67~~ | ~~62~~ | ~~42~~ | ~~10~~ |
| ~~Packaging Configuration Group 4~~ | | | | | | |
| ~~Filter $H_2$ Diffusivity[a] (mol/s/mol fraction)~~ | ~~Headspace Sample Taken Inside Pipe Component~~ | | | | | |

| | | | |
|---|---|---|---|
| ~~> 1.9 × $10^{-5}$~~ | ~~152~~ | | |
| ~~Packaging Configuration Group 5~~ | | | |
| ~~Filter $H_2$ Diffusivity[a, c] (mol/s/mol fraction)~~ | ~~Headspace Sample Taken Inside SWB/TDOP/SLB2~~ | | |
| ~~> 7.4 × $10^{-5}$ (SWB)~~ | ~~15~~ | | |
| ~~3.33 × $10^{-5}$ (TDOP)~~ | ~~15~~ | | |
| ~~6.60 × $10^{-4}$ (SLB2)~~ | ~~21~~ | | |
| ~~Packaging Configuration Group 6~~ | | | |
| ~~Filter $H_2$ Diffusivity[a, c] (mol/s/mol fraction)~~ | ~~Headspace Sample Taken Inside SWB/TDOP/SLB2~~ | | |
| ~~> 7.4 × $10^{-5}$ (SWB)~~ | ~~56~~ | | |
| ~~3.33 × $10^{-5}$ (TDOP)~~ | ~~56~~ | | |
| ~~6.60 × $10^{-4}$ (SLB2)~~ | ~~56~~ | | |
| ~~Packaging Configuration Group 7[d]~~ | | | |
| ~~Filter $H_2$ Diffusivity[a] (mol/s/mol fraction)~~ | ~~Inner Lid Filter Vent Minimum $H_2$ Diffusivity (mol/s/mol fraction)[a]~~ | | |
| | ~~7.4 × $10^{-6}$~~ | ~~1.85 × $10^{-5}$~~ | ~~9.25 × $10^{-5}$ [e]~~ |
| ~~3.7 × $10^{-5}$~~ | ~~13~~ | ~~7~~ | ~~2~~ |
| ~~7.4 × $10^{-5}$~~ | ~~10~~ | ~~6~~ | ~~2~~ |
| ~~1.85 × $10^{-5}$~~ | ~~6~~ | ~~4~~ | ~~2~~ |
| ~~Packaging Configuration Group 8~~ | | | |
| ~~Filter $H_2$ Diffusivity[a] (mol/s/mol fraction)~~ | ~~Inner Lid Filter Vent Minimum $H_2$ Diffusivity (mol/s/mol fraction)~~ | | |
| | ~~7.4 × $10^{-6}$~~ | | |
| ~~3.7 × $10^{-5}$~~ | ~~21~~ | | |

~~[a] The documented filter $H_2$ diffusivity must be greater than or equal to the listed value to use the DAC for the listed filter $H_2$ diffusivity (e.g., a container with a filter $H_2$ diffusivity of 4.2 × $10^{-6}$ must use a DAC for a filter with a 3.7 × $10^{-6}$ filter $H_2$ diffusivity). If a filter $H_2$ diffusivity for a container is undocumented or unknown or is less than 1.9 × $10^{-5}$ filter $H_2$ diffusivity, a filter of known $H_2$ diffusivity that is greater than or equal to 1.9 × $10^{-5}$ filter $H_2$ diffusivity must be installed prior to initiation of the relevant DAC period.~~

~~[b] The documented rigid liner vent hole diameter must be greater than or equal to the listed~~

~~value to use the DAC for the listed rigid liner vent hole diameter (e.g., a container with a rigid liner vent hole of 0.5 in. must use a DAC for a rigid liner vent hole of 0.375 in.). If the rigid liner vent hole diameter for a container is undocumented during packaging, repackaging, and/or venting (Section C1-1a[4][ii]), that container must use a DAC for a rigid liner vent hole diameter of 0.30 in.~~

~~[c] The filter $H_2$ diffusivity for SWBs, TDOPs, or SLB2s is the sum of the diffusivities for all of the filters on the container because SWBs, TDOPs, and SLB2s have more than 1 filter.~~

~~[d] Headspace sample taken between inner and outer drum lids. If headspace sample is taken inside the filtered inner drum lid prior to placement of the outer drum lid, then a DAC value of 2 days may be used. Footnote e is also applicable. Packaging Configuration Group 7 DAC values apply to drums with up to two lids.~~

~~[e] While a DAC value of 2 days may be determined, containers must comply with the equilibrium requirements specified in Section C1-1a (i.e., 72 hours at 18°C or higher). The equilibrium requirement for headspace gas sampling shall be met separately.~~

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# ~~FIGURES~~

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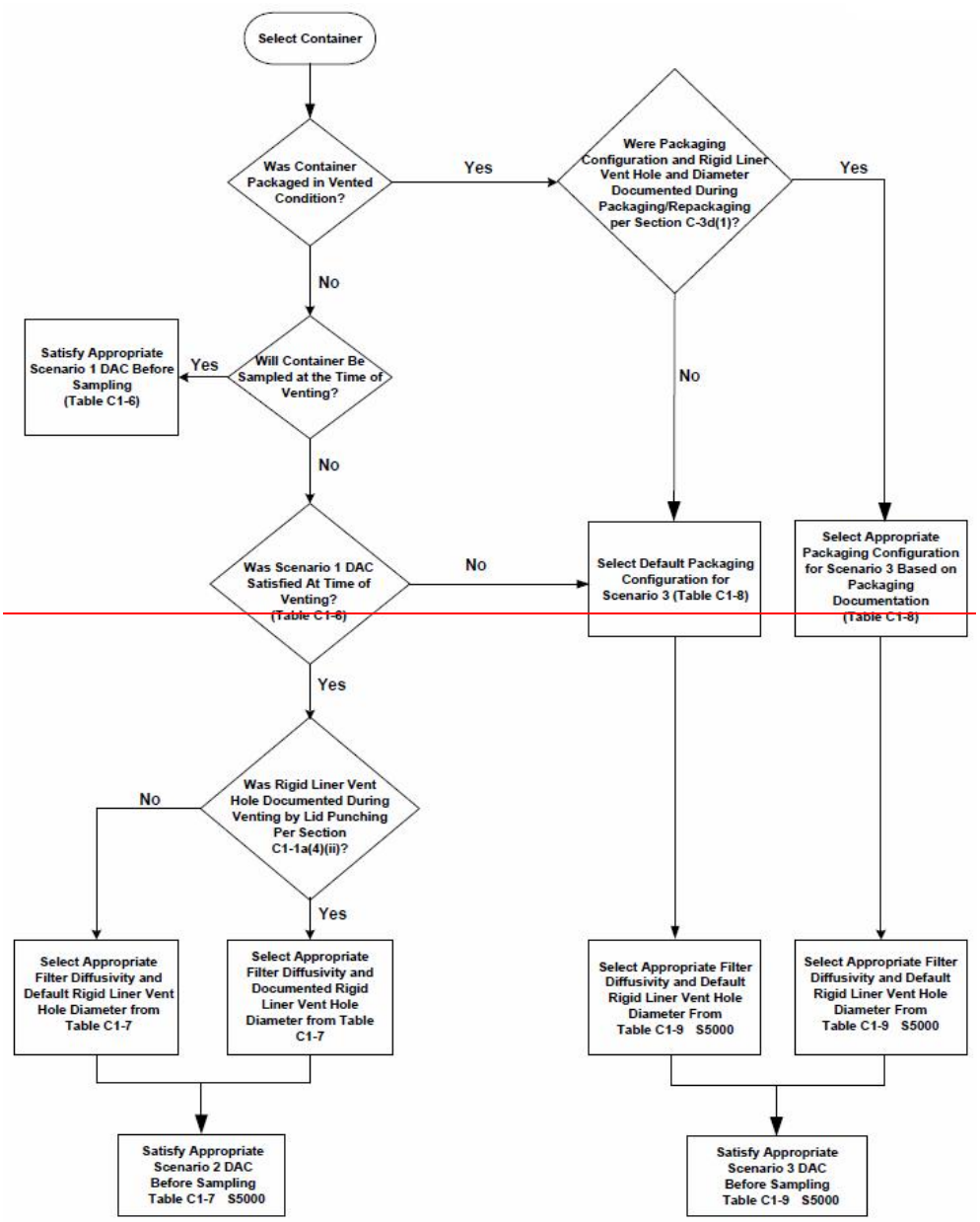
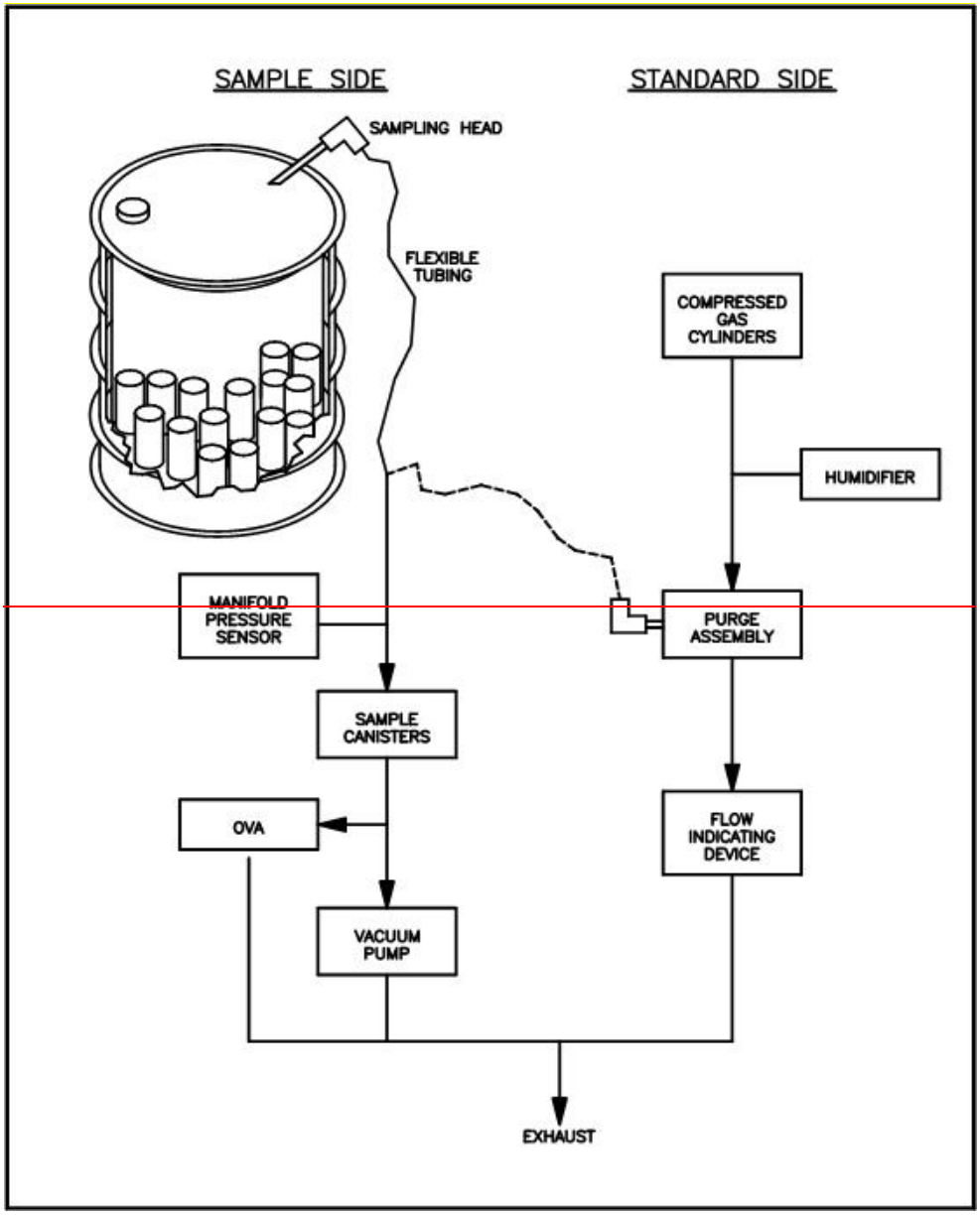
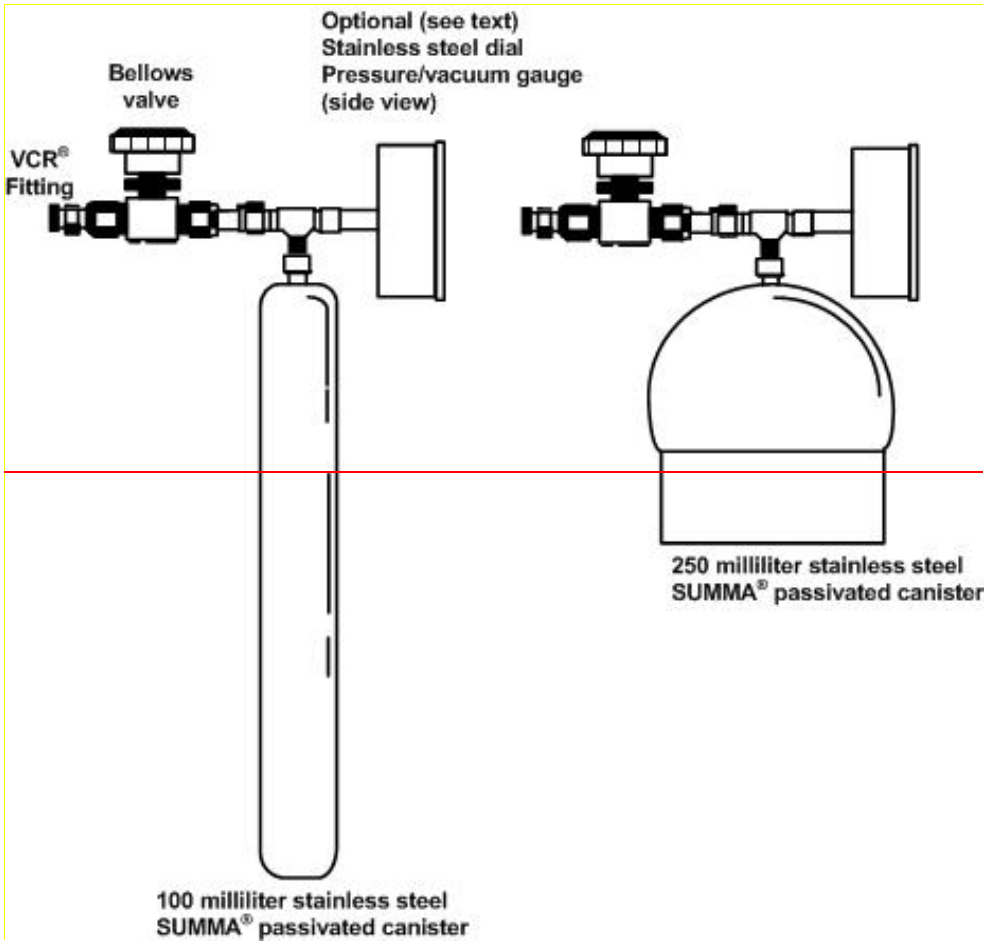



~~**Figure C1-1**~~
~~**Headspace Gas Drum Age Criteria Sampling Scenario Selection Process**~~




~~Figure C1-2~~
~~Headspace Sampling Manifold~~




~~Figure C1-3~~
~~SUMMA® Canister Components Configuration (Not to Scale)~~

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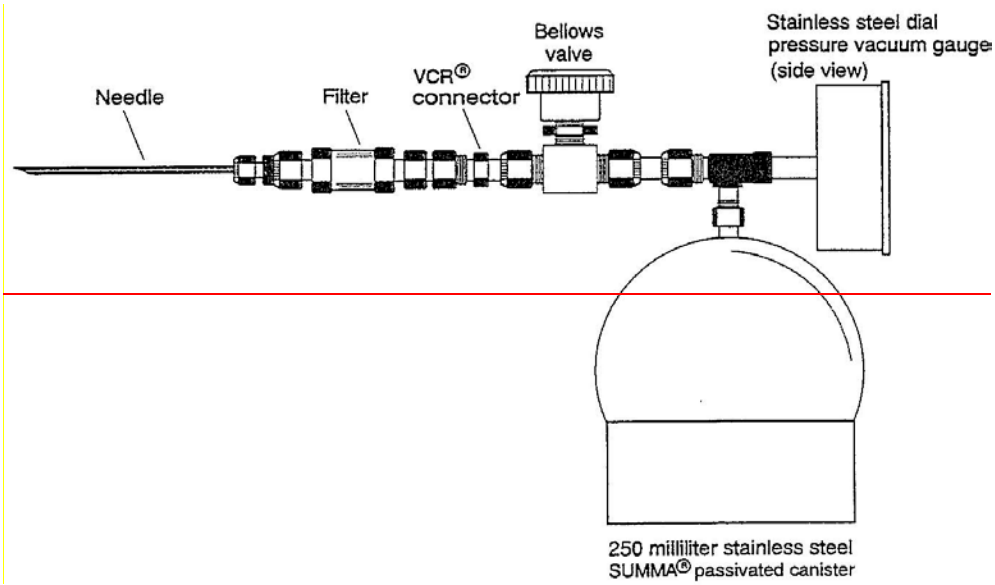
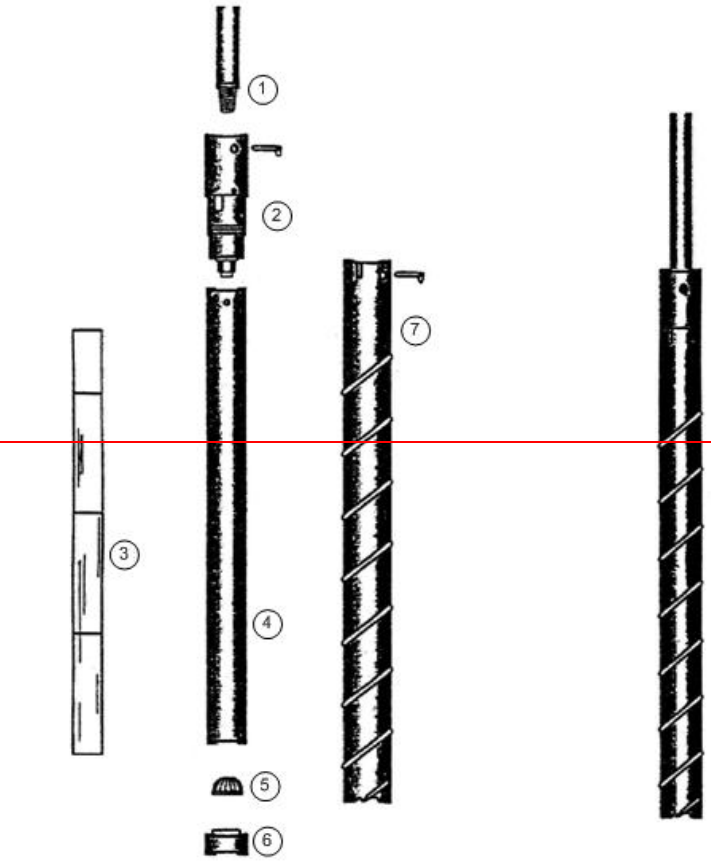
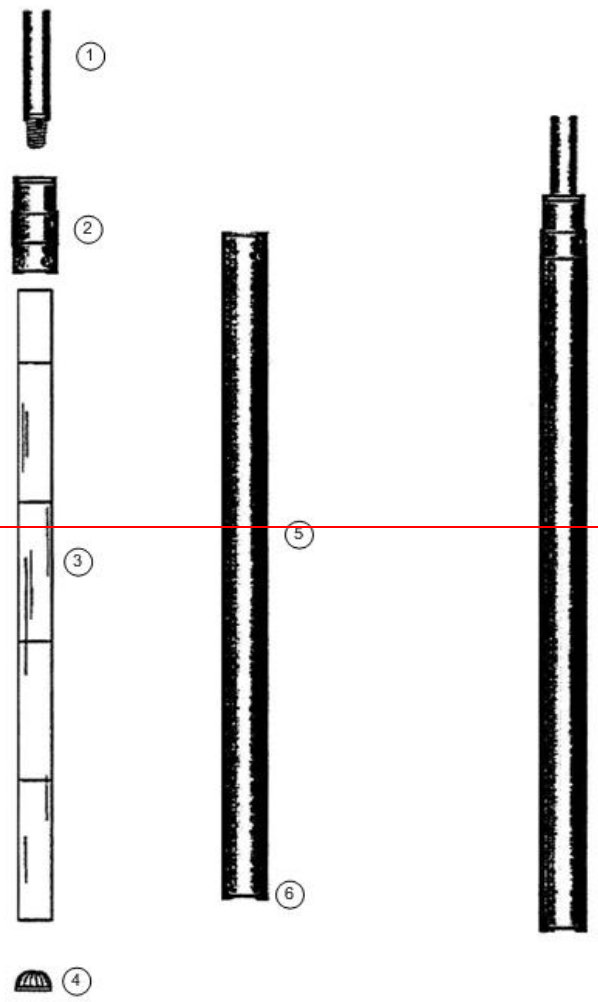



~~**Figure C1-4**~~
~~**Schematic Diagram of Direct Canister with the Poly Bag Sampling Head**~~



1. Drill Rod
2. Thrust Bearing Ball Check Valve
3. Clear Teflon® Liners
4. Core Barrel
5. Spring Retainer (opitonal)
6. Core barrel tip
7. Auger and Pin

~~**Figure C1-5**~~
~~**Rotational Coring Tool (Light Weight Auger)**~~




1 Drill Rod
2 Ball check valve
3 Clear Teflon® liners
4 Spring Retainer (optional)
5 Tube
6 Tapered Tip

~~**Figure C1-6**~~
~~**Non-Rotational Coring Tool (Thin Walled Sampler)**~~

# ATTACHMENT C2

# RESERVED

# ATTACHMENT C2

## ~~STATISTICAL METHODS USED IN SAMPLING AND ANALYSIS~~RESERVED

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# ~~ATTACHMENT C2~~

# ~~STATISTICAL METHODS USED IN SAMPLING AND ANALYSIS~~

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~~**Figure Title**~~

~~Figure C2-1 Approach for Solid and Headspace Gas Sampling and Analysis to Obtain Additional Waste Characterization Information~~

# ATTACHMENT C2

# STATISTICAL METHODS USED IN SAMPLING AND ANALYSIS

## Introduction

The Permittees shall require generator/storage sites (**sites**) to use the following statistical methods for sampling and analysis of TRU mixed waste which is managed, stored, or disposed at WIPP, unless determined unnecessary by the U.S. Department of Energy (**DOE**) as a result of an Acceptable Knowledge (AK) Sufficiency Determination. These statistical methods include methods for selecting waste containers for totals analysis, selecting waste containers for headspace gas sampling and analysis, and setting the upper confidence limit.

## C2-1 Approach for Selecting Waste Containers for Statistical Sampling

### C2-1a Statistical Selection of Containers for Totals Analysis

The statistical approach for characterizing retrievably stored and newly generated homogeneous solids (S3000) and soil/gravel (S4000) waste and repackaged or treated S3000 waste relies on using acceptable knowledge to segregate waste containers into relatively homogeneous waste streams. Using acceptable knowledge, generator/storage sites will classify the entire waste stream as hazardous or nonhazardous rather than individual waste containers. Individual waste containers serve as convenient units for characterizing the combined mass of waste from the waste stream of interest. Once segregated by waste stream, random selection and sampling of the waste containers followed by analysis of the waste samples shall be performed to ensure that the resulting mean contaminant concentration provides an unbiased representation of the true mean contaminant concentration for each waste stream. The Permittees shall require each site project manager to verify that the samples collected from within a waste stream were selected randomly.

An end use of analytical results for retrievably stored homogeneous solids and soil/gravel is for assigning the Environmental Protection Agency (**EPA**) hazardous waste numbers associated with toxicity characteristic waste (D-numbers) that apply to each mixed waste stream. The toxicity characteristic D-numbers are indicators that the waste exhibits the toxicity characteristic for specific contaminants under the Resource Conservation and Recovery Act (**RCRA**). The RCRA-toxicity determination is made on the basis of sampling and analysis of waste streams and on whether or not the waste stream includes F-number wastes. If a waste stream includes one or more RCRA F-numbers identified via acceptable knowledge, toxicity characteristic contaminants associated with the F-number waste(s) are not included in the RCRA-toxicity characteristic determination. That is, the F-numbers take precedence over RCRA-toxicity D-number, and the waste stream is assumed hazardous regardless of the concentration. Therefore, toxicity characteristics contaminants associated with F-numbers for a waste stream shall be omitted from all calculations for determining the number of containers to sample because these wastes streams are assumed to be hazardous. In addition, each toxicity characteristic contaminant associated with the F-number(s) shall be excluded from evaluation of analytical results to determine D-numbers. Contaminants of interest for the sampling, analysis, and RCRA-toxicity determination of a waste stream, then, excludes contaminants associated with F-numbers that have been assigned to the waste stream.

The sampling and analysis strategy is illustrated in Figure C2-1. Preliminary estimates of the mean concentration and variance of each RCRA regulated contaminant in the waste will be used to determine the number of waste containers to select for sampling and analysis. Preliminary estimates will be based on a minimum of five samples selected randomly from the waste stream. If the entire waste stream is not accessible for sampling then a minimum of five preliminary samples will be selected randomly from the accessible population. As the rest of the waste stream is retrieved or generated, additional selected containers will be sampled as provided below and the analytical results will be reported to the Permittees. Samples collected to establish preliminary estimates that are selected, sampled, and analyzed using a DOE approved laboratory in accordance with applicable provisions of the WAP may be used as part of the required number of samples to be collected. The applicability of the preliminary estimates to the waste stream to be sampled shall be justified and documented. The preliminary estimates will be determined in accordance with the following equations:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \qquad \text{(C2-1)}$$

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}\left(x_i - \bar{x}\right)^2 \qquad \text{(C2-2)}$$

Where:

$\bar{x}$ = the calculated mean.
$s^2$ = the calculated concentration variance.
n = the number of samples analyzed.
$x_i$ = the concentration determined in the *ith* sample.
*i* = an index from 1 to n.

Based upon the preliminary estimates of $\bar{x}$ and $s^2$ for each chemical contaminant of concern, estimate the appropriate minimum number of samples (*n*) to be collected for each contaminant using the following formula from SW-846 (EPA 1996):

$$n = \frac{t^2_{\alpha,n_0-1}\, s^2}{\left(RT - \bar{x}\right)^2} \qquad \text{(C2-3)}$$

Where:

$n_0$ = the initial number of samples used to calculate the preliminary estimates.
*n* = the calculated minimum number of samples to be collected.
$t_{\alpha,n-1}$ = the 90th percentile for the *t* distribution with $n_0$-1 degrees of freedom.
*RT* = the Regulatory Threshold of the contaminant (TC limit for toxicity characteristic wastes, PRQL for listed wastes)

~~The number of samples to be collected will be based upon the largest *n* calculated for each of the contaminants of concern. The actual number of samples collected shall be adjusted as necessary to ensure that an adequate number of samples are collected to allow for acceptable levels of completeness.~~

~~Non-integer results of calculations for the required sample size should be rounded up to the next integer. A minimum of five containers shall be sampled and analyzed in each waste stream. If there are fewer containers than the minimum or required number of samples in a waste stream, one or more randomly selected containers shall be sampled more than once to obtain the number of needed samples of the waste. Otherwise any one container may be selected for sampling only once.~~

~~The calculated total number of required waste containers will then be randomly sampled and analyzed using a DOE approved laboratory. Waste container samples from the preliminary mean and variance estimates may be counted as part of the total number of calculated required samples if and only if:~~

- ~~There is documented evidence that the waste containers for the preliminary estimate samples were selected in the same random manner as is chosen for the required samples.~~

- ~~There is documented evidence that the method of sample collection in the preliminary estimate samples were identical to the methodology to be employed for the required samples.~~

- ~~There is documented evidence that the method of sample analysis in the preliminary estimate samples were identical to the analytical methodology employed for the required samples.~~

- ~~There is documented evidence that the validation of the sample analyses in the preliminary estimate samples were comparable to the validation employed for the required samples. In addition, the validated samples results shall indicate that all sample results were valid according to the analytical methodology.~~

~~If only a portion of a waste stream is accessible for sampling (e.g., the remainder of the waste stream will be recovered from storage at the generator/storage site, or only a portion of the waste stream has been repackaged, treated, or generated), the calculated number of samples will be randomly selected from the accessible portion of the waste stream. A minimum of five randomly selected samples will be obtained and analyzed from the accessible portion of the waste stream. DOE may approve the WSPF and authorize the generator/storage site to begin shipping the waste stream to WIPP once the analytical data for the randomly selected samples from the accessible portion of the waste stream have been obtained.~~

~~The generator/storage site will also randomly select the calculated number of sample locations from the waste stream as a whole. A minimum of five randomly selected sample locations will be selected from the waste stream as a whole. As those randomly selected locations (e.g., buried or newly generated waste containers) become accessible for sampling, samples will be obtained and analyzed.~~

For those waste streams where the population of the waste stream as a whole is indeterminate (e.g., continually generated waste streams from ongoing processes) or to facilitate waste processing, the generator/storage site may divide the waste stream into lots. In this case, a minimum of five randomly selected sample locations will be selected from within each subsequent lot. As those randomly selected locations (e.g., buried or newly generated waste containers) become accessible, samples will be obtained and analyzed. As with sampling from the waste stream as a whole, the generator/storage site may ship waste from the lot being generated or retrieved prior to completing sampling and analysis of the lot.

The generator/storage site will use the data to update the $UCL_{90}$ values for the waste stream as described in Section C2-2a and assign EPA hazardous waste numbers as appropriate. The generator/storage sites will submit the analytical data from subsequent sampling to the Permittees for inclusion in the WIPP facility operating record upon completion of project level data validation in Permit Attachment C3, Section C3-10b. If changes to EPA hazardous waste numbers are required as a result of subsequent sampling, the generator/storage site will notify the Permittees and shipments of the affected waste stream shall be suspended until DOE approves a revised WSPF for the affected waste stream.

Upon collection and analysis of the preliminary samples, or at any time after the preliminary samples have been analyzed, the generator/storage site may presumptively assign hazardous waste numbers to a waste stream even if the calculated number of required samples is greater than the preliminary number of samples collected. For waste streams with calculated upper confidence limits below the regulatory threshold, the site shall collect the required number of samples if the site intends to establish that the constituent is below the regulatory threshold.

C2-1b Statistical Selection of Containers for Headspace Gas Analysis

Headspace gas sampling of a waste stream may be done on a randomly selected portion of containers in the waste stream. The minimum number of containers, *n*, that must be sampled is determined by taking an initial VOC sample from ten randomly selected containers. These samples are analyzed for all the target analytes analytes using a DOE approved laboratory. The standard deviation, *s*, is calculated for each of the nine VOCs in Part 4, Table 4.4.1. The value of *n* is determined as the largest number of samples (not to exceed the number of containers in the waste stream or waste stream lot) calculated using the following equation:

$$n_{voc_i} = \frac{t^2_{\alpha,n-1} s^2 e_{voc_i}}{E^2_{voc_i}} \qquad \text{(C2-4)}$$

Where:

$n_{voci}$ = the number of samples needed to representatively sample the waste stream for the $VOC_i$ from Table 4.4.1
$t_{\alpha,n-1}$ = the 90th percentile of the *t* distribution with *n*-1 degrees of freedom
$s_{evoci}$ = the estimated standard deviation, based on the initial *n* samples, for $VOC_i$ from Table 4.4.1
$E_{voci}$ = the allowable error determined as 1 percent of the limiting concentration for $VOC_i$ from Table 4.4.1

~~Non-integer results of calculations for the required sample size should be rounded up to the next integer. A minimum of ten containers shall be sampled and analyzed in each waste stream. If there are fewer containers than the minimum or required number of samples in a waste stream, then each container should be sampled once.~~

~~The calculated total number of required waste containers will then be randomly sampled and analyzed. Waste container samples from the preliminary mean and variance estimates may be counted as part of the total number of calculated required samples if and only if:~~

- ~~There is documented evidence that the waste containers for the preliminary estimate samples were selected in the same random manner as is chosen for the required samples.~~

- ~~There is documented evidence that the method of sample collection in the preliminary estimate samples were identical to the methodology to be employed for the required samples.~~

- ~~There is documented evidence that the method of sample analysis in the preliminary estimate samples were identical to the analytical methodology employed for the required samples.~~

- ~~There is documented evidence that the validation of the sample analyses in the preliminary estimate samples were comparable to the validation employed for the required samples. In addition, the validated samples results shall indicate that all sample results were valid according to the analytical methodology.~~

~~The mean and standard deviation calculated after sampling *n* containers can be used to calculate a $UCL_{90}$ for each of the headspace gas VOCs using the methodology presented in Section C2-2b.~~

~~If only a portion of a waste stream is accessible for sampling (e.g., the remainder of the waste stream will be recovered from storage at the generator/storage site or only a portion of the waste stream has been repackaged or treated), the calculated number of samples will be randomly selected from the accessible portion of the waste stream. A minimum of ten randomly selected samples will be obtained and analyzed from the accessible portion of the waste stream. DOE may approve the WSPF and authorize the generator/storage site to begin shipping the waste stream to WIPP once the analytical data for the randomly selected samples from the accessible portion of the waste stream has been obtained.~~

~~The generator/storage site will also randomly select the calculated number of sample locations from the waste stream as a whole. A minimum of ten randomly selected sample locations will be selected from the waste stream as a whole. As those randomly selected locations (e.g., buried or newly generated waste containers) become accessible for sampling, samples will be obtained and analyzed.~~

~~For those waste streams where the population of the waste stream as a whole is indeterminate (e.g., continually generated waste streams from ongoing processes) or to facilitate waste processing, the generator/storage site may divide the waste stream into lots. In this case, a minimum of ten randomly selected containers will be selected from within each subsequent lot. As those randomly selected containers (e.g., buried or newly generated waste containers)~~

become accessible, samples will be obtained and analyzed. As with sampling from the waste stream as a whole, the generator/storage site may ship waste from the lot being generated or retrieved prior to completing sampling and analysis of the lot.

The generator/storage site will use the data to update the $UCL_{90}$ values for the waste stream as described in Section C2-2b and assign EPA hazardous waste numbers as appropriate. The generator/storage sites will submit the analytical data from subsequent sampling to the Permittees for inclusion in the WIPP facility operating record upon completion of project level data validation in Permit Attachment C3, Section C3-10b. If changes to EPA hazardous waste numbers are required as a result of subsequent sampling, the generator/storage site will notify the Permittees, and shipments of the affected waste stream shall be suspended until DOE approves a revised WSPF for the affected waste stream.

Upon collection and analysis of the preliminary samples, or at any time after the preliminary samples have been analyzed, the generator/storage site may presumptively assign hazardous waste numbers to a waste stream even if the calculated number of required samples is greater than the preliminary number of samples collected. For waste streams with calculated upper confidence limits below the regulatory threshold, the site shall collect the required number of samples if the site intends to establish that the constituent is below the regulatory threshold.

## C2-2 Upper Confidence Limits for Statistical Sampling

### C2-2a Upper Confidence Limit for Statistical Solid Sampling

Upon completion of the required sampling, final mean and variance estimates and the $UCL_{90}$ for the mean concentration for each contaminant shall be determined. The observed sample *n** shall be checked against the preliminary estimate for the number of samples (n) to be collected before proceeding, where n* is:

$$n^* = \frac{t^2_{\alpha,n-1} s^2}{\left(RT - \bar{x}\right)^2} \qquad \text{(C2-5)}$$

and the right-side terms in the equation are as defined in Section C2-1a.

If the observed sample *n** estimate results in greater than 20 percent or more required samples than were originally calculated, then the additional samples required to fulfill the revised sample estimate shall be collected and analyzed. The determination of *n** is an iterative process that follows the collection and analysis of any additional samples and continues until the difference between *n** and the previous sample size determination is less than 20 percent.

Once sufficient sampling and analysis has occurred, the waste characterization will proceed. The assessment will be made at the 90 percent confidence level. The $UCL_{90}$ for the mean concentration of each contaminant will be calculated using the following equation from OSWER 9285.6-10 (EPA 2002):

$$UCL_{90} = \bar{x} + \frac{t_{\alpha,n-1}s}{\sqrt{n}} \qquad \text{(C2-6)}$$

If the $UCL_{90}$ for the mean concentration is less than the regulatory threshold limit, the waste stream is not required to be assigned the hazardous waste number for the associated contaminant. If the $UCL_{90}$ is greater than or equal to the regulatory threshold limit, the waste stream will be assigned the hazardous waste number for the associated contaminant.

C2-2b Upper Confidence Limit for Statistical Headspace Gas Sampling

A $UCL_{90}$ concentration for each of the headspace gas VOCs must be calculated from the sample data collected. The observed sample *n** shall be checked against the estimate for the number of samples (n) to be collected before proceeding, where n* is:

$$n^* = \frac{t^2_{\alpha,n-1}s^2}{E^2} \qquad \text{(C2-7)}$$

where *E* is as defined in Section C2-1b and the remaining right-side terms in the equation are defined in Section C2-1a. When composite headspace gas sample results are used, the mean, standard deviation, and t-statistic are based on the number of composite samples analyzed, rather than the number of containers sampled.

If the observed sample *n** estimate results in greater than 20 percent or more required samples than were originally calculated, then the additional samples required to fulfill the revised sample estimate shall be collected and analyzed. The determination of *n** is an iterative process that follows the collection and analysis of any additional samples and continues until the difference between *n** and the previous sample size determination is less than 20 percent. The $UCL_{90}$ is then calculated using equation C2-6. In this case, $UCL_{90}$ is the 90 percent upper confidence limit for the mean VOC concentration, $\bar{x}$ is the calculated sample mean VOC concentration and *s* is the calculated sample standard deviation. The value of $t_{(\alpha,n-1)}$ is found in Table 9-2 of Chapter 9 of SW-846 (EPA, 1996).

## ~~References~~

~~U.S. EPA, 1996. *Test Methods for Evaluating Solid Waste*. SW-846, Office of Solid Waste and Emergency Response, Washington DC.~~

~~U.S. EPA, 2002. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites*. OSWER 9285.6-10, Office of Emergency and Remedial Response, Washington DC.~~

# ~~FIGURES~~

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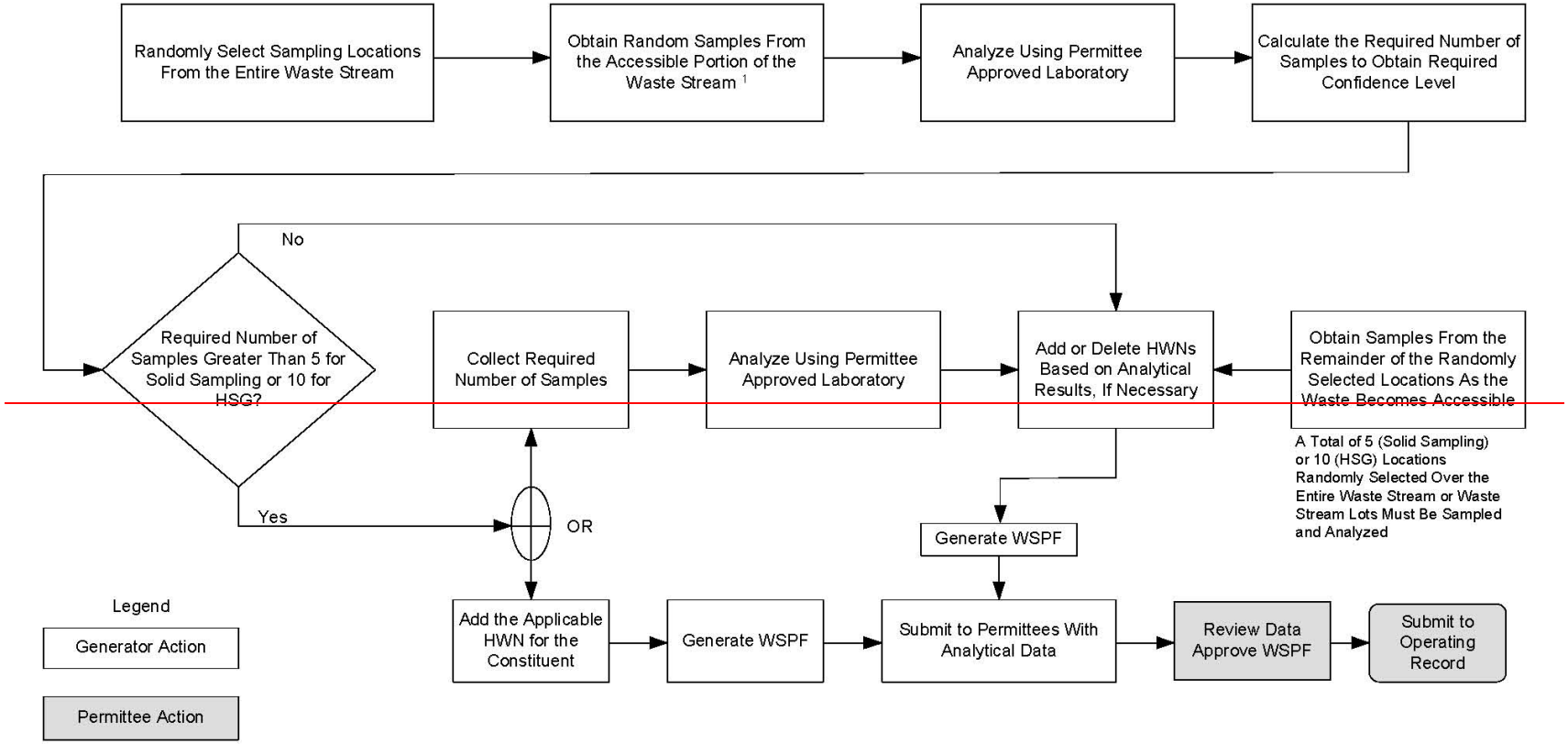


[1] Samples Are Obtained From the First Five Accessible Random Locations for Solid Sampling and the First Ten Accessible Random Locations for Headspace Gas Sampling

**~~Figure C2-1~~**
**~~Approach for Solid and Headspace Gas Sampling and Analysis to Obtain Additional Waste Characterization Information~~**

# ATTACHMENT C3

# QUALITY ASSURANCE OBJECTIVES AND DATA VALIDATION TECHNIQUES FOR WASTE CHARACTERIZATION METHODS

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# ATTACHMENT C3

# QUALITY ASSURANCE OBJECTIVES AND DATA VALIDATION TECHNIQUES FOR WASTE CHARACTERIZATION METHODS

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# ATTACHMENT C3

# QUALITY ASSURANCE OBJECTIVES AND DATA VALIDATION TECHNIQUES FOR WASTE CHARACTERIZATION METHODS

## C3-1 Validation Methods

The Permittees shall require the generator/storage sites (**sites**) to perform validation of all data so that data used for Waste Isolation Pilot Plant (**WIPP**) compliance programs will be of known and acceptable quality.

The qualitative data or descriptive information generated by radiography and visual examination is not amenable to statistical data quality analysis. However, radiography and visual examination are complementary techniques yielding similar data for determining the waste matrix code. The waste matrix code is determined to ensure that the container is properly included in the appropriate waste stream.

Data validation will be used to assess the quality of waste characterization data collected based upon project precision, accuracy, completeness, comparability, and representativeness objectives. These objectives are described below:

### Precision

Precision is a measure of the mutual agreement among multiple measurements.

### Accuracy

Accuracy is the degree of agreement between a measured 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.

### Comparability

Comparability is the degree to which one data set can be compared to another.

### Representativeness

Representativeness is the degree to which sample represent a characteristic of a population.

## C3-2 Non Destructive Examination Methods

### Quality Assurance Objectives

The QAOs for non destructive examination (**NDE**) are detailed in this section. NDE can be either radiography or visual examination (**VE**). If the QAOs described below are not met, then corrective action shall be taken. It should be noted that NDE is primarily a qualitative determination. The objective of NDE for the program is to verify that the physical form of the

waste matches the waste stream description as determined by AK and the absence of prohibited items. The Permittees shall require each site to describe all activities required to achieve these objectives in the site quality assurance project plan (**QAPjP**) and standard operating procedures (**SOP**).

C3-2a Radiography

Data to meet these objectives must be obtained from a video and audio recorded scan provided by trained radiography operators at the sites. Results must also be recorded on a radiography data form. The precision, accuracy, completeness, and comparability objectives for radiography data are presented below.

Precision

Precision is maintained by reconciling any discrepancies between two radiography operators with regard to identification of the waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases through independent replicate scans and independent observations. Additionally, the precision of radiography is verified prior to use by tuning precisely enough to demonstrate compliance with QAOs through viewing an image test pattern.

Accuracy

Accuracy is obtained by using a target to tune the image for maximum sharpness and by requiring operators to successfully identify 100 percent of the items required to meet the DQOs for radiography specified in Permit Attachment C, Section C-4a(1) in a training container during their initial qualification and subsequent requalification.

Completeness

A video and audio media recording of the radiography examination and a validated radiography data form will be obtained for 100 percent of the waste containers subject to radiography. All video and audio media recordings and radiography data forms will be subject to validation as indicated in Section C3-4.

Comparability

The comparability of radiography data from different operators shall be enhanced by using standardized radiography procedures and operator qualifications.

C3-2b Visual Examination

Results must be recorded on a VE data form. The precision, accuracy, completeness, and comparability objectives for VE data are presented below.

Precision

Precision is maintained by reconciling any discrepancies between the operator and the independent technical reviewer with regard to identification of waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases.

Accuracy

Accuracy is maintained by requiring operators to pass a comprehensive examination and demonstrate satisfactory performance in the presence of the VE expert during their initial qualification. VE operators shall be requalified every two years.

Completeness

A validated VE data form will be obtained for 100 percent of the waste containers subject to VE.

Comparability

The comparability of VE data from different operators shall be enhanced by using standardized VE procedures and operator qualifications.

## C3-3 Acceptable Knowledge

Acceptable knowledge documentation provides primarily qualitative information that cannot be assessed according to specific data quality goals that are used for quantitative techniques. To ensure that the acceptable knowledge process is consistently applied, the Permittees shall require sites to comply with the following data quality requirements for acceptable knowledge documentation:

- Precision - The qualitative determinations, such as compiling and assessing acceptable knowledge documentation, do not lend themselves to statistical evaluations of precision. However, the acceptable knowledge information will be addressed by the independent review of acceptable knowledge information during internal and external audits.

- Accuracy - The percentage of waste containers which require reassignment to a new waste matrix code and/or designation of different hazardous waste numbers based on testing data and discrepancies identified by the Permittees during waste confirmation will be reported as a measure of acceptable knowledge accuracy.

- Completeness - The acceptable knowledge record must contain 100 percent of the required information (Permit Attachment C4-3). The usability of the acceptable knowledge information will be assessed for completeness during audits.

- Comparability - Comparability is ensured through sites meeting the training requirements and complying with the minimum standards outlined for procedures that are used to implement the acceptable knowledge process. All sites must assign hazardous waste numbers in accordance with Permit Attachment C4-3b and provide this information regarding its waste to other sites who store or generate a similar waste stream.

- Representativeness - Representativeness is a qualitative parameter that will be satisfied by ensuring that the process of obtaining, evaluating, and documenting acceptable knowledge information is performed in accordance with the minimum standards established in Permit Attachment C4. Sites also must assess and document the limitations of the acceptable knowledge information used to assign

hazardous waste numbers (e.g., purpose and scope of information, date of publication, type and extent to which waste parameters are addressed).

The Permittees shall require each generator/storage site to comply with the nonconformance notification and reporting requirements of Section C3-7 if the results of testing specified in Permit Attachment C are inconsistent with acceptable knowledge documentation.

The Permittees shall require each site to address quality control by tracking its performance with regard to the use of acceptable knowledge by: 1) assessing the frequency of inconsistencies among information, and 2) documenting acceptable knowledge inconsistencies identified through radiography and visual examination. In addition, the acceptable knowledge process and waste stream documentation must be evaluated through internal assessments by generator/storage site quality assurance organizations and assessments by auditors external to the organization (i.e., the Permittees).

## C3-4 Data Review, Validation, and Verification Requirements

Procedures shall be developed for the review, validation, and verification of data at the data generation level; the validation and verification of data at the project level; and the verification of data at the Permittee level. Data review determines if raw data have been properly collected and ensures raw data are properly reduced. Data validation verifies that the data reported satisfy the requirements of this WAP and is accompanied by signature release. Data verification authenticates that data as presented represent the testing activities as performed and have been subject to the appropriate levels of data review. The requirements presented in this section ensure that WAP records furnish documentary evidence of quality.

The Permittees shall require the sites to generate the following Batch Data Reports for data validation, verification, and quality assurance activities:

- A Testing Batch Data Report or equivalent includes all data pertaining to radiography or visual examination for up to 20 waste containers without regard to waste matrix. Table C3-3 lists all of the information required in Testing Batch Data Reports (identified with an “X”) and other information that is necessary for data validation, but is optional in Testing Batch Data Reports (identified with an “O”).

### C3-4a Data Generation Level

The following are minimum requirements for raw data collection and management which the Permittees shall require for each site:

- All raw data shall be signed and dated in reproducible ink by the person generating it. Alternately, unalterable electronic signatures may be used.

- All data must be recorded clearly, legibly, and accurately in field records.

- All changes to original data must be lined out, initialed, and dated by the individual making the change. A justification for changing the original data may also be included. Original data must not be obliterated or otherwise disfigured so as not to be readable. Data changes shall only be made by the individual who originally collected the data or an individual authorized to change the data.

- All data must be transferred and reduced from field records completely and accurately.

- All field records must be maintained as specified in Table C-2 of Attachment C.

- Data must be organized into a standard format for reporting purposes (Batch Data Report), as outlined in specific testing procedures.

- All electronic and video data must be stored appropriately to ensure that waste container and associated QC data are readily retrievable. In the case of classified information, additional security provisions may apply that could restrict retrievability. The additional security provisions will be documented in generator/storage site procedures as outlined in the QAPjP in accordance with prevailing classified information security standards.

Data review, validation, and verification at this level involves scrutiny and signature release from qualified independent technical reviewer(s) not involved in the generation or recording of the data under review, as specified below. Individuals conducting this data review, validation, and verification must use checklists that address all of the items included in this section. Completed checklists must be forwarded with Batch Data Reports to the project level.

C3-4a(1) Independent Technical Review

The independent technical review ensures by review of raw data that data generation and reduction are technically correct; calculations are verified correct; deviations are documented; and QA/QC results are complete, documented correctly, and compared against WAP criteria. This review validates and verifies all of the work documented by the originator.

One hundred percent of the Batch Data Reports must receive an independent technical review by a trained and qualified individual who was not involved in the generation or recording of the data under review. This review shall be performed by an individual other than the data generator who is qualified to have performed the initial work. The independent technical review must be performed as soon as practicably possible in order to determine and correct negative quality trends in the testing process. However at a minimum, the independent technical review must be performed before any waste associated with the data reviewed is managed, stored, or disposed at WIPP. The reviewer(s) must release the data as evidenced by signature, and as a consequence ensure the following:

- Data generation and reduction were conducted in a technically correct manner in accordance with the methods used (procedure with revision). Data were reported in the proper units and correct number of significant figures.

- Calculations have been verified by a valid calculation program, a spot check of verified calculation programs, and/or 100 percent check of all hand calculations. Values that are not verifiable to within rounding or significant difference discrepancies must be rectified prior to completion of independent technical review.

- The data have been reviewed for transcription errors.

- The testing data QA documentation for Batch Data Reports is complete and includes, as applicable, raw data, calculation records, calibration records (or references to an available calibration package). Corrective action will be taken to ensure that all Batch Data Reports are complete and include all necessary raw data prior to completion of the independent technical review.

- Radiography tapes have been reviewed (independent observation) on a waste container basis at a minimum of once per testing batch or once per day of operation, whichever is less frequent (Attachment C1, Section C1-1). The radiography tape will be reviewed against the data reported on the radiography form to ensure that the data are correct and complete.

- QAOs have been met according to the methods outlined in Sections C3-2 and C3-3.

C3-4b Project Level

Data validation and verification at this level involves scrutiny and signature release from the Site Project Manager (or designee). The Permittees shall require each site to meet the following minimum requirements for each waste container. Any nonconformance identified during this process shall be documented on a nonconformance report (Section C3-7).

The Site Project Manager shall ensure that a repeat of the data generation level review, validation, and verification is performed on the data for a minimum of one randomly chosen waste container quarterly (every three months). This exercise will document that the data generation level review, validation, and verification is being performed according to implementing procedures.

C3-4b(1) Site Project Manager Review

The Site Project Manager Review is the final validation that all of the data contained in Batch Data Reports from the data generation level are complete and have been properly reviewed as evidenced by signature release and completed checklists.

One hundred percent of the Batch Data Reports must have Site Project Manager signature release. At a minimum, the Site Project Manager signature release must be performed before any waste associated with the data reviewed is managed, stored, or disposed at WIPP. This signature release must ensure the following:

- Testing batch QC checks (e.g., replicate scans, measurement system checks) were properly performed. Radiography data are complete and acceptable based on evidence of videotape review of one waste container per day or once per testing batch, whichever is less frequent, as specified in Permit Attachment C1, Section C1-1.

- Data generation level independent technical review, validation, and verification have been performed as evidenced by the completed review checklists and appropriate signature releases.

- Independent technical reviewers were not involved in the generation or recording of the data under review.
- Batch data review checklists are complete.
- Batch Data Reports are complete and data are properly reported (e.g., data are reported in the correct units, and with the correct number of significant figures).
- Verify that data are within established data assessment criteria and meet all applicable QAOs (Sections C3-2 and C3-3).

C3-4b(2) Prepare Site Project Manager Summary and Data Validation Summary

To document the project-level validation and verification described above, the Permittees shall require each Site Project Manager (or designee) to prepare a Site Project Manager Summary and a Data Validation Summary. These reports may be combined to eliminate redundancy. The Site Project Manager Summary includes a validation checklist for each Batch Data Report. Checklists for the Site Project Manager Summary must be sufficiently detailed to validate all aspects of a Batch Data Report that affect data quality. The Data Validation Summary provides verification that, on a per waste container basis as evidenced by Batch Data Report reviews, all data have been validated in accordance with the site QAPjP. The Data Validation Summary must identify each Batch Data Report reviewed (including all waste container numbers), describe how the validation was performed and whether or not problems were detected (e.g., nonconformance reports), and include a statement indicating that all data are acceptable. Summaries must include release signatures.

C3-4b(3) Prepare Waste Stream Characterization Package

In the event the Permittees request detailed information on a waste stream, the Site Project Manager will provide a Waste Stream Characterization Package. The Site Project Manager must ensure that the Waste Stream Characterization Package (Section C3-12b(3)) will support waste characterization determinations.

C3-4c Permittee Level

The final level of data verification occurs at the Permittee level and must, at a minimum, consist of reviewing a sample of the Batch Data Reports during audits of generator/storage sites to verify completeness. During such audits, DOE is responsible for the verification that Batch Data Reports include the following:

- Project-level signature releases
- Listing of all waste containers being presented in the report
- Listing of all testing, batch numbers associated with each waste container being reported in the package
- Site Project Manager Summary
- Data Validation Summary

For each Waste Stream Profile Form (**WSPF**) submitted for approval, DOE must verify that each submittal (i.e., WSPF and Characterization Information Summary) is complete and notify the originating site in writing of the WSPF approval. DOE will maintain the data as appropriate for use in the regulatory compliance programs. For subsequent shipments made after the initial WSPF approval, the verification will also include WWIS internal limit checks (Attachment C, Section C-5a(1)).

## C3-5 Reconciliation with Data Quality Objectives

Reconciling the results of waste testing with the DQOs provides a way to ensure that data will be of adequate quality to support the regulatory compliance programs. Reconciliation with the DQOs will take place at both the project level and the Permittees' level. At the project level, reconciliation will be performed by the Site Project Manager, while at the Permittees' level, reconciliation will be performed as described below.

### C3-5a Reconciliation at the Project Level

The Permittees shall require each Site Project Manager to ensure that all data generated and used in decision making meet the DQOs provided in Section C-4a(1) of Permit Attachment C. To do so, the Site Project Manager must assess whether data of sufficient type, quality, and quantity have been collected. For each waste stream characterized, the Permittees shall require each Site Project Manager to determine if sufficient data have been collected to determine the following WAP-required waste parameters, as applicable:

- Waste matrix code
- Waste material parameter weights
- If each waste container of waste contains TRU radioactive waste
- Whether the waste stream exhibits a toxicity characteristic (**TC**) under 40 CFR Part 261, Subpart C
- Whether the waste stream contains listed waste found in 20.4.1.200 NMAC incorporating 40 CFR Part 261, Subpart D
- Whether the waste stream can be classified as hazardous or nonhazardous
- Whether the overall completeness, comparability, and representativeness QAOs were met for each of the testing procedures as specified in Sections C3-2 and C3-3 prior to submittal of a WSPF for a waste stream or waste stream lot.

If the Site Project Manager determines that insufficient data have been collected to make the determinations listed above, additional data collection efforts must be undertaken. The reconciliation of a waste stream shall be performed, as described in Permit Attachment C4, prior to submittal of WSPF and Characterization Information Summary to the Permittees for that waste stream. The Permittees shall not manage, store, or dispose a TRU mixed waste stream at WIPP unless the Site Project Manager determines that the WAP-required waste parameters listed above have been met for that waste stream.

### C3-5b Reconciliation at the Permittee Level

The Permittees must also ensure that data of sufficient type, quality, and quantity are collected to meet WAP DQOs. The Permittees will ensure sufficient data have been collected to determine if the waste characterization information is adequate to demonstrate the Permittees' compliance with Attachment C, Section C-4a(1). This is performed during the Permittees' review of the WSPF and Characterization Information Summary and is documented by DOE's approval of the WSPF.

## C3-6 Data Reporting Requirements

Data reporting requirements define the type of information and the method of transmittal for data transfer from the data generation level to the project level and from the project level to the Permittees.

### C3-6a Data Generation Level

Data shall be transmitted by hard copy or electronically (provided a hard copy is available on demand) from the data generation level to the project level. Transmitted data shall include all Batch Data Reports and data review checklists. The Batch Data Reports and checklists used must contain all of the information required by the testing techniques described in Permit Attachments C1 through C6, as well as the signature releases to document the review, validation, and verification as described in Section C3-4. All Batch Data Reports and checklists shall be in approved formats, as provided in site-specific documentation.

Batch Data Reports shall be forwarded to the Site Project Manager. All Batch Data Reports shall be assigned serial numbers, and each page shall be numbered. The serial number used for Batch Data Reports can be the same as the testing batch number.

QA documentation, including raw data, shall be maintained in either testing facility files, or site project files for those facilities located on site in accordance with the document storage requirements of site approved site QAPjPs.

### C3-6b Project Level

The site project office shall prepare a WSPF for each waste stream certified for shipment to WIPP based on information obtained from acceptable knowledge and Batch Data Reports, if applicable. In addition, the site project office must ensure that the Characterization Information Summary and the Waste Stream Characterization Package (when requested by the Permittees) are prepared as appropriate. The Site Project Manager must also verify these reports are consistent with information found in batch reports. Summarized testing data are included in the Characterization Information Summary. The contents of the WSPF, Characterization Information Summary, and Waste Stream Characterization Package are discussed in the following sections.

After approval of a WSPF and the associated Characterization Information Summary by DOE, the generator/storage site are required to maintain a cross reference of container identification numbers to each Batch Data Report.

A Waste Stream Characterization Package shall be transmitted by hard copy or electronically from the Site Project Manager to the Permittees when requested.

C3-6b(1) Waste Stream Profile Form

The Waste Stream Profile Form (WSPF, Figure C-1) shall include the following information:

- Generator/storage site name
- Generator/storage site EPA ID
- Date of audit report approval by NMED (if obtained)
- Original generator of waste stream
- Whether waste is Contact-Handled or Remote-Handled
- The Waste Stream WIPP Identification Number
- Summary Category Group
- Waste Matrix Code Group
- Waste Material Parameter Weight Estimates per unit of waste
- Waste stream name
- A description of the waste stream
- Applicable EPA hazardous waste numbers
- Applicable TRUCON codes
- A listing of acceptable knowledge documentation used to identify the waste stream
- The waste characterization procedures used and the reference and date of the procedure
- Certification signature of Site Project Manager, name, title, and date signed

C3-6b(2) Characterization Information Summary

The Characterization Information Summary shall include the following elements, if applicable:

- Data reconciliation with DQOs
- Radiography and VE summary to document that all prohibited items are absent in the waste and to verify that the physical form of the waste matches the waste stream description as determined by AK (if applicable).
- A justification for the selection of radiography and/or VE as an appropriate method for characterizing the waste.

- A complete listing of all container identification numbers used to generate the WSPF, cross-referenced to each Batch Data Report

- Complete AK summary, including stream name and number, point of generation, waste stream volume (current and projected), generation dates, TRUCON codes, Summary Category Group, Waste Matrix Code(s) and Waste Matrix Code Group, other TWBIR information, waste stream description, areas of operation, generating processes, RCRA determinations, radionuclide information, all references used to generate the AK summary, and any other information required by Permit Attachment C4, Section C4-2b.

- Method for determining Waste Material Parameter Weights per unit of waste.

- List of any AK Sufficiency Determinations requested for the waste stream.

- Certification through acceptable knowledge or testing that any waste assigned the hazardous waste number of U134 (hydrofluoric acid) no longer exhibits the characteristic of corrosivity. This is verified by ensuring that no liquid is present in U134 waste.

C3-6b(3) Waste Stream Characterization Package

The Waste Stream Characterization Package includes the following information:

- Waste Stream Profile Form (WSPF, Section C3-6b(1))

- Accompanying Characterization Information Summary (Section C3-6b(2))

- Complete AK summary (Section C3-6b(2))

- Batch Data Reports supporting the characterization of the waste stream and any others requested by the Permittees

- Raw testing data requested by the Permittees

C3-6b(4) WIPP Waste Information System (**WWIS**) Data Reporting

The WWIS Data Dictionary includes all of 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* (DOE, 2009).

## C3-7 Nonconformances

The Permittees shall require the status of work and the WAP activities at participating generator/storage sites to be monitored and controlled by the Site Project Manager. This monitoring and control shall include nonconformance identification, documentation, and reporting.

The nonconformances and corrective action processes specified in this section describe procedures between the Permittees and the generator/storage sites.

Nonconformances

Nonconformances are uncontrolled and unapproved deviations from an approved plan or procedure. Nonconforming items and activities are those that do not meet the WAP requirements, procurement document criteria, or approved work procedures. Nonconforming items shall be identified by marking, tagging, or segregating, and the affected generator/storage site(s) notified. Any waste container for which a nonconformance report (**NCR**) has been written will not be shipped to the WIPP facility unless the condition that led to the NCR for that container has been dispositioned in accordance with DOE's Quality Assurance Program Description (**QAPD**). Disposition of nonconforming items shall be identified and documented. The QAPjPs shall identify the person(s) responsible for evaluating and dispositioning nonconforming items and shall include referenced procedures for handling them. For each container selected for confirmation pursuant to Permit Attachment C7, the Permittees will examine the respective NCR documentation to verify NCRs have been dispositioned for the selected container.

Management at all levels shall foster a "no-fault" attitude to encourage the identification of nonconforming items and processes. Nonconformances may be detected and identified by anyone performing WAP activities, including

- Project staff - during field operations, supervision of subcontractors, data validation and verification, and self-assessment
- Testing Facility staff - during the preparation for and performance of laboratory testing; calibration of equipment; QC activities; data review, validation, and verification; and self-assessment
- QA personnel - during oversight activities or audits

A NCR shall be prepared for each nonconformance identified. Each NCR shall be initiated by the individual(s) identifying the nonconformance. The NCR shall then be processed by knowledgeable and appropriate personnel. For this purpose, a NCR including, or referencing as appropriate, results of QC tests, audit reports, internal memoranda, or letters shall be prepared. The NCR must provide the following information:

- Identification of the individual(s) identifying or originating the nonconformance
- Description of the nonconformance
- Method(s) or suggestions for correcting the nonconformance (corrective action)
- Schedule for completing the corrective action
- An indication of the potential ramifications and overall usability of the data, if applicable
- Any approval signatures specified in the site nonconformance procedures

The Permittees shall require the Site Project Manager to oversee the NCR process and be responsible for developing a plan to identify and track all nonconformances and report this information to the Permittees. The Site Project Manager is also responsible for notifying project

personnel of the nonconformance and verifying completion of the corrective action for nonconformances.

Nonconformance to DQOs

For any non-administrative nonconformance related to applicable requirements specified in this WAP which are first identified at the Site Project Manager signature release level (i.e., a failure to meet a DQO), the Permittees shall receive written notification within seven calendar days of identification and shall also receive a NCR within 30 calendar days of identification of the incident. DOE shall require the generator/storage site to implement a corrective action which remedies the nonconformance prior to management, storage, or disposal of the waste at WIPP. The Permittees shall send NMED a monthly summary of nonconformances identified during the previous month, indicating the number of nonconformances received and the generator/storage sites responsible.

DOE's Corrective Action Process

DOE shall initiate a corrective action process when internal nonconformances and nonconformances at the generator/storage sites are identified. Activities and processes that do not meet requirements are documented as deficiencies.

When a deficiency is identified by the Permittees, the following process action steps are required:

- The condition is documented on a Corrective Action Report (**CAR**) by the individual identifying the problem.
- DOE has designated the CAR Initiator and Assessment Team Leader to review the CAR, determine validity of the finding (determine that a requirement has been violated), classify the significance of the condition, assign a response due date, and issue the CAR to the responsible party.
- The responsible organization reviews the CAR, evaluates the extent and cause of the deficiency and provides a response to DOE, indicating remedial actions and actions to preclude recurrence that will be taken.
- DOE reviews the response from the responsible organization and, if acceptable, communicates the acceptance to the responsible organization.
- The responsible organization completes remedial actions and actions to preclude recurrence of the condition.
- After all corrective actions have been completed, DOE schedules and performs a verification to ensure that corrective actions have been completed and are effective. When all actions have been completed and verified as being effective, the CAR is closed by the CAR Initiator and Assessment Team Leader on behalf of DOE.

- As part of the planning process for subsequent audits and surveillances, past deficiencies are reviewed and the previous deficient activity or process is subject to reassessment.

## C3-8 Special Training Requirements and Certifications

Before performing activities that affect WAP quality, all personnel are required to receive indoctrination into the applicable scope, purpose, and objectives of the WAP and the specific QAOs of the assigned task. Personnel assigned to perform activities for the WAP shall have the education, experience, and training applicable to the functions associated with the work. Evidence of personnel proficiency and demonstration of competence in the task(s) assigned must be demonstrated and documented. All personnel designated to work on specific aspects of the WAP shall maintain qualification (i.e., training and certification) throughout the duration of the work as specified in this WAP and applicable QAPjPs/procedures. Job performance shall be evaluated and documented at periodic intervals, as specified in the implementing procedures.

Personnel involved in WAP activities shall receive continuing training to ensure that job proficiency is maintained. If not specified by this WAP, the due date for required continuing training courses and requalification shall be the end of the month of the anniversary date when the training was previously completed. Training includes both education in principles and enhancement of skills. Each participating site shall include in its QAPjP a description of the procedures for implementing personnel qualification and training. All training records that specify the scope of the training, the date of completion, and documentation of job proficiency shall be maintained as QA Records in the site project file.

The minimum qualifications for certain specified positions for the WAP are summarized in Table C3-2. QAPjPs, or their implementing SOPs, shall specify the site-specific titles and minimum training and qualification requirements for personnel performing WAP activities. QAPjPs/procedures shall also contain the requirements for maintaining records of the qualification, training, and demonstrations of proficiency by these personnel.

An evaluation of personnel qualifications shall include comparing and evaluating the requirements specified in the job/position description and the skills, training, and experience included in the current resume of the person. This evaluation also must be performed for personnel who change positions because of a transfer or promotion as well as personnel assigned to short-term or temporary work assignments that may affect the quality of the WAP. QAPjPs/procedures shall identify the responsible person(s) for ensuring that all personnel maintain proficiency in the work performed and identify any additional training that may be required.

## C3-9 Changes to WAP-Related Plans or Procedures

Controlled changes to WAP-related plans or procedures shall be managed through the document control process described in the QAPD. The Site Project Manager shall review all non-administrative changes and evaluate whether those changes could impact DQOs specified in the Permit. After site certification, any changes to WAP-related plans or procedures that could positively or negatively impact DQOs (i.e., those changes that require prior approval of DOE as defined in Attachment C5, Section C5-2) shall be reported to DOE within five days of identification by the project level review. The Permittees shall send NMED a monthly summary

briefly describing the changes to plans and procedures identified pursuant to this section during the previous month.

## C3-10 List of References

DOE, 2009. Waste Data System User's Manual. DOE/WIPP 09-3427, Current Revision, Carlsbad, New Mexico, Carlsbad Area Office, U.S. Department of Energy.

Pasternack B. S. and N. H. Harley. 1971. "Detection Limits for Radionuclides in the Analysis of Multi-Component Gamma-Spectrometric Data." *Nucl. Instr. and Meth,* No. 91: pp. 533-40.

# TABLES

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**Table C3-1**
**Waste Material Parameters and Descriptions**

| Waste Material Parameter | Description |
|---|---|
| Iron-based Metals/Alloys | Iron and steel alloys in the waste; does not include the waste container materials |
| Aluminum-based Metals/Alloys | Aluminum or aluminum-based alloys in the waste materials |
| Other Metals | All other metals found in the waste materials |
| Other Inorganic Materials | Nonmetallic inorganic waste including concrete, glass, firebrick, ceramics, sand, and inorganic sorbents |
| Cellulosics | Materials generally derived from high-polymer plant carbohydrates; (e.g., paper, cardboard, wood, and cloth) |
| Rubber | Natural or man-made elastic latex materials; (e.g., surgeons' gloves, and leaded rubber gloves) |
| Plastics (waste materials) | Generally man-made materials, often derived from petroleum feedstock; (e.g., polyethylene and polyvinylchloride) |
| Organic Matrix | Cemented organic resins, solidified organic liquids and sludges |
| Inorganic Matrix | Any homogeneous materials consisting of sludge or aqueous-based liquids that are solidified with cement, calcium silicate, or other solidification agents; (e.g., wastewater treatment sludge, cemented aqueous liquids, and inorganic particulates) |
| Soils/gravel | Generally consists of naturally occurring soils that have been contaminated with inorganic waste materials |
| Steel (packaging materials) | 55-gal (208-L) drums |
| Plastics (packaging materials) | 90-mil polyethylene drum liner and plastic bags |

**Table C3-2**
**Minimum Training and Qualifications Requirements**

| Personnel | Requirements |
|---|---|
| Radiography Operators [a] | Site-specific training based on waste matrix codes and waste material parameters; requalification every 2 years |
| | |
| | |
| | |
| | |
| | |
| | |

[a] Operators are those persons responsible for the actual operation of testing equipment. QAPjPs shall include the site-specific title for this position.

**Table C3-3**
**Testing Batch Data Report Contents**

| Required Information | Radiography | Visual Examination | Comment |
|---|---|---|---|
| Batch Data Report Date | X | X | |
| Batch number | X | X | |
| Waste container number | X | X | |
| Waste stream name and/or number | O | O | |
| Waste Matrix Code | X | X | Summary Category Group included in waste matrix code |
| Implementing procedure (specific version used) | X | X | If procedure cited contains more than one method, the method used must also be cited. Can use revision number, date, or other means to track specific version used. |
| Container type | O | O | Drums, Standard Waste Box, Ten Drum Overpack, etc. |
| Video media reference | X | X | Reference to Video media applicable to each container. For visual examination of newly generated waste, video media not required if two trained operators review the contents of the waste container to ensure correct reporting. |
| Imaging check | O | | |
| Camera check | | O | |
| Audio check | O | O | |
| QC documentation | X | X | |
| Verification that the physical form matches the waste stream description and Waste Matrix Code. | X | X | Summary Category Group included in waste matrix code |
| Comments | X | X | |
| Reference to or copy of associated NCRs, if any | X | X | Copies of associated NCRs must be available. |
| Verify absence of prohibited items | X | X | |
| Operator signature and date of test | X | X | Signatures of both operators required for Visual Verification of Acceptable Knowledge |
| Data review checklists | X | X | All data review checklists will be identified |

LEGEND:

X - Required in batch data report.

O - Information must be documented and traceable; inclusion in batch data report is optional.

**ATTACHMENT C3**

**QUALITY ASSURANCE OBJECTIVES AND DATA VALIDATION TECHNIQUES FOR WASTE CHARACTERIZATION ~~SAMPLING AND ANALYTICAL~~ METHODS**

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# ATTACHMENT C3

# QUALITY ASSURANCE OBJECTIVES AND DATA VALIDATION TECHNIQUES FOR WASTE CHARACTERIZATION ~~SAMPLING AND ANALYTICAL~~ METHODS

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# ATTACHMENT C3

# QUALITY ASSURANCE OBJECTIVES AND DATA VALIDATION TECHNIQUES FOR WASTE CHARACTERIZATION SAMPLING AND ANALYTICAL METHODS

## C3-1 Validation Methods

The Permittees shall require the generator/storage sites (**sites**) to perform validation of all data ~~(qualitative as well as quantitative)~~ so that data used for Waste Isolation Pilot Plant (**WIPP**) compliance programs will be of known and acceptable quality. ~~Validation includes a quantitative determination of precision, accuracy, completeness, and method detection limits (as appropriate) for analytical data (headspace Volatile Organics Compounds (**VOC**), total VOCs, Semivolatile Organic Compounds (**SVOC**), and metals data). Quantitative data validations shall be performed according to the conventional methods outlined below (equations C3-1 through C3-8). These quantitative determinations will be compared to the Quality Assurance Objectives (**QAOs**) specified in Sections C3-2 through C3-9. A qualitative determination of comparability and representativeness will also be performed.~~

The qualitative data or descriptive information generated by radiography and visual examination is not amenable to statistical data quality analysis. However, radiography and visual examination are complementary techniques yielding similar data for determining the waste matrix code. The waste matrix code is determined to ensure that the container is properly included in the appropriate waste stream.

Data validation will be used to assess the quality of waste characterization data collected based upon project precision, accuracy, completeness, comparability, and representativeness objectives. These objectives are described below:

### Precision

Precision is a measure of the mutual agreement among multiple measurements. ~~of a single analyte, either by the same method or by different methods. Precision is either expressed as the relative percent difference (**RPD**) for duplicate measurements or as the percent relative standard deviation (**%RSD**) for three or more replicate measurements. For duplicate measurements, the precision expressed as the RPD is calculated as follows:~~

$$RPD = \frac{C_1 - C_2}{\frac{(C_1 + C_2)}{2}} \times 100 \quad \text{(C3-1)}$$

~~where $C_1$ and $C_2$ are the two values obtained by analyzing the duplicate samples. $C_1$ is the larger of the two observed values.~~

~~For three or more replicate measurements, the precision expressed as the %RSD is calculated as follows:~~

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$$\%RSD = \frac{s}{y_{mean}} \times 100 \qquad \text{(C3-2)}$$

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~~where s is the standard deviation and $y_{mean}$ is the mean of the replicate sample analyses.~~

~~The standard deviation, s, is calculated as follows:~~

$$s = \sqrt{\frac{\sum_{i=1}^{n}(y_i - y_{mean})^2}{n-1}} \qquad \text{(C3-3)}$$

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~~where $y_i$ is the measured value of the *i*th replicate sample analysis measurement, and n equals the number of replicate analyses.~~

~~Another aspect of precision is associated with analytical equipment calibration. In these instances, the percent difference (**%D**) between multiple measurements of an equipment calibration standard shall be calculated as follows:~~

$$\%D = \frac{|C_1 - C_2|}{C_1} \times 100 \qquad \text{(C3-4)}$$

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~~where $C_1$ is the initial measurement and $C_2$ is the second or other additional measurement.~~

Accuracy

Accuracy is the degree of agreement between a measured result ~~analyte concentration (or the average of replicate measurements of a single analyte concentration)~~ and the true or known value. ~~concentration. Accuracy is determined as the percent recovery (**%R**).~~

~~For situations where a standard reference material is used, the %R is calculated as follows:~~

$$\%R = \frac{C_m}{C_{srm}} \times 100 \qquad \text{(C3-5)}$$

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~~where $C_m$ is the measured concentration value obtained by analyzing the sample and $C_{srm}$ is the "true" or certified concentration of the analyte in the sample.~~

~~For measurements where matrix spikes are used, the %R is calculated as follows:~~

$$\%R = \frac{S - U}{C_{SC}} \times 100 \qquad \text{(C3-6)}$$

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~~where S is the measured concentration in the spiked aliquot, U is the measured concentration in the unspiked aliquot, and $C_{SC}$ is the actual concentration of the spike added.~~

~~Method Detection Limit~~

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~~The method detection limit (**MDL**) is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The MDL for all quantitative measurements (except for those using Fourier Transform Infrared Spectroscopy [**FTIRS**]) is defined as follows:~~

$$MDL = t_{(n-1,1-\alpha=.99)} \times s \quad \text{(C3-7)}$$

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~~where $t_{(n-1,1-\alpha=.99)}$ is the t-distribution value corresponding to a 99 percent confidence level with n-1 degrees of freedom, n is the number of observations, and s is the standard deviation of replicate measurements.~~

~~For headspace-gas analysis using FTIRS, MDL is defined as follows:~~

$$MDL = 3s \quad \text{(C3-8)}$$

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~~where s is the standard deviation. Initially, a minimum of seven samples spiked at a level of three to five times the estimated MDL and analyzed on non-consecutive days must be used to establish the MDLs. MDLs should be updated using the results of the laboratory control sample or on-line control samples.~~

Completeness

Completeness is a measure of the amount of valid data obtained from a method ~~the overall measurement system~~ compared to the total amount of data obtained. ~~collected and submitted for analysis. Completeness must be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. Completeness, expressed as the percent complete (**%C**), is calculated as follows:~~

$$\%C = \frac{V}{n} \times 100 \quad \text{(C3-9)}$$

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~~where V is the number of valid sampling or analytical results obtained and n is the number of samples submitted for analysis.~~

Comparability

Comparability is the degree to which one data set can be compared to another. ~~Comparability of data generated at different sites will be ensured through the use of standardized, approved testing, sampling, preservation, and analytical techniques and by meeting the QAOs specified in Sections C3-2 through C3-9.~~

~~The comparability of waste characterization data shall be ensured through the use of generator/storage site data usability criteria. The Permittees shall ensure that data usability criteria are consistently established and used by the generator/storage sites to assess the usability of analytical and testing data. The criteria shall address, as appropriate, the following:~~

~~Definition or reference of criteria used to define and assign data qualifier flags based on Quality Assurance Objective results;~~

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~~Criteria for assessing the usability of data impacted by matrix interferences,~~

~~Criteria for assessing the usability of data based upon positive and negative bias as indicated by quality control data, of data qualifiers, and qualifier flags,~~

~~Criteria for assessing the usability of data due to~~

~~Severe matrix effects,~~

~~Misidentification of compounds,~~

~~Gross exceedance of holding times,~~

~~Failure to meet calibration or tune criteria~~

~~Criteria for assessing the usability of data that does not meet minimum detection limit requirements.~~

~~The Permittees shall be responsible for evaluating generator/storage site data usability and the U.S. Department of Energy (**DOE**) shall assess implementation through the generator/storage site audit.~~

Representativeness

Representativeness is the degree to which ~~sample~~ data represent a characteristic of a population.~~, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that concerns the proper design of the sampling program.~~

~~Representativeness of waste containers from waste streams subjected to headspace gas, homogeneous solids, and soil/gravel sampling and analysis will be validated, through documentation, that a true random sample with an adequate population was identified and collected consistent with Permit Attachment C2, Section C2-1. Since representativeness is a quality characteristic that expresses the degree to which a sample or group of samples represents the population being studied, the random selection of waste containers ensures representativeness on a Program level. The Permittees shall require the Site Project Manager to document that the selected waste containers from within a waste stream were randomly selected. Sampling personnel shall verify that proper procedures are followed to ensure that samples are representative of the waste contained in a particular waste container or a waste stream.~~

~~Identification of Tentatively Identified Compounds~~

~~In accordance with SW-846 convention, identification of compounds detected by gas chromatography/mass spectrometry methods that are not on the list of target analytes shall be reported. Both composited and individual container headspace gas, volatile analysis (TCLP/Totals), and semi-volatile (TCLP/Totals) shall be subject to tentatively identified compound (**TIC**) reporting. These TICs for GC/MS Methods are identified in accordance with the following SW-846 criteria:~~

~~Relative intensities of major ions in the reference spectrum (ions greater than 10% of the most abundant ion) should be present in the sample spectrum.~~

~~The relative intensities of the major ions should agree within ± 20 percent.~~

~~Molecular ions present in the reference spectrum should be present in the sample spectrum.~~

~~Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.~~

~~Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks.~~

~~The reference spectra used for identifying TICs shall include, at minimum, all of the available spectra for compounds that appear in the 20.4.1.200 NMAC (incorporating 40 CFR Part 261) Appendix VIII list. The reference spectra may be limited to VOCs when analyzing headspace gas samples.~~

~~TICs for headspace gas analyses that are performed through FTIRS analyses shall be identified in accordance with the specifications of SW-846 Method 8410.~~

~~TICs shall be reported as part of the analytical batch data reports for GC/MS Methods in accordance with the following minimum criteria:~~

~~a TIC in an individual container headspace gas or solids sample shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 10% of the area of the nearest internal standard.~~

~~a TIC in a composited headspace gas sample that contains 2 to 5 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 2% of the area of the nearest internal standard.~~

~~a TIC in a composited headspace gas sample that contains 6 to 10 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 1% of the area of the nearest internal standard.~~

~~a TIC in a composited headspace gas sample that contains 11 to 20 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 0.5% of the area of the nearest internal standard.~~

~~TICs that meet the SW-846 identification criteria, are reported in 25 percent of all waste containers sampled from a given waste stream, and that appear in the 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII list, will be compared to acceptable knowledge data to determine if the TIC is a listed 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 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 a listed waste constituent TIC cannot be attributed to waste packaging materials, radiolysis, or other origins, the constituent will be added to the target analyte list and new hazardous waste numbers will be assigned, if appropriate. 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 numbers 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 number. If a target analyte list for a waste stream is expanded due to the presence of TICs, all subsequent samples collected from that waste stream will be analyzed for constituents on the expanded list.~~

~~C3-2 Headspace-Gas Sampling~~

~~Quality Assurance Objectives~~

~~The precision and accuracy of the container headspace-gas sampling operations must be assessed by analyzing field QC headspace-gas samples. These samples must include equipment blanks, field reference standards, field blanks, and field duplicates. If the QAOs described below are not met, a nonconformance report must be prepared, submitted, and resolved (Section C3-13).~~

~~Precision~~

~~The precision of the headspace-gas sampling and analysis operation must be assessed by sequential collection of field duplicates for manifold sampling operations or simultaneous collection of field duplicates for direct canister sampling operations for VOCs determination. Corrective actions must be taken if the RPD exceeds 25 percent for any analyte found greater than the PRQL in both of the duplicate samples.~~

~~Accuracy~~

~~A field reference standard must be collected using headspace-gas sampling equipment to assess the accuracy of the headspace-gas sampling operation at a frequency of one field reference standard for every 20 containers sampled or per sampling batch. Corrective action must be taken if the %R of the field-reference standard is less than 70 or greater than 130.~~

~~Field blanks must also be collected at a frequency of 1 field blank for every 20 containers or sampling batch sampled to assess possible contamination in the headspace gas sampling method. Equipment blanks must also be collected at a frequency of 1 equipment blank for each equipment cleaning batch to assess possible contamination in the equipment cleaning method. Corrective actions must be taken if the blank exceeds three times the MDLs listed for any of the compounds listed in Table C3-2.~~

~~Completeness~~

~~Sampling completeness shall be expressed as the number of valid samples collected as a percent of the total number of samples collected for each waste stream A valid sample is defined as a sample collected in accordance with approved sampling methods and the container was properly prepared for sampling (e.g., the polyliner was vented to the container headspace). The Permittees shall require participating sampling facilities to achieve a minimum 90 percent completeness. The amount and type of data that may be lost during the headspace-gas sampling operation cannot be predicted in advance. The Permittees shall require the Site Project Manager to evaluate the importance of any lost or contaminated headspace-gas samples and take corrective action as appropriate.~~

~~Comparability~~

~~Consistent use and application of uniform procedures and equipment, as specified in Permit Attachment C1 and application of data usability criteria, should ensure that headspace-gas sampling operations are comparable when sampling headspace at the different sampling facilities. The Permittees shall require each site to take corrective actions if uniform procedures, equipment, or operations are not followed without approved and justified deviations. In addition, laboratories analyzing samples must successfully participate in the Performance Demonstration Program (**PDP**) (DOE, 2003).~~

~~Representativeness~~

~~Specific headspace-gas sampling steps to ensure samples are representative include:~~

- ~~Selection of the correct Drum Age Criteria (**DAC**) Scenario and waste packaging configuration and meeting DAC equilibrium times.~~
- ~~A sample canister cleaning and leak check after assembly~~
- ~~Sampling equipment cleaning or disposal after use~~
- ~~Sampling equipment leak check after sample collection~~
- ~~Use of sample canisters with passivated internal surfaces~~
- ~~Use of low-internal-volume sampling equipment~~
- ~~Collection of samples with a low-sample volume to available headspace volume ratio (less than 10 percent of the headspace when the headspace can be determined)~~
- ~~Careful and documented pressure regulation of all activities specified in Attachment C1, Section C1-1~~
- ~~Performance audits~~
- ~~Collection of equipment blanks, field reference standard, field blanks, and field duplicates at the specified frequencies.~~

~~Manifold pressure sensors and temperature sensors calibrated before initial use and annually using NIST, or equivalent standards.~~

~~OVA calibrated daily, prior to first use, or as necessary according to manufacturer's specifications.~~

~~Failure to perform the checks at the prescribed frequencies would result in corrective actions.~~

~~C3-3 Sampling of Homogeneous Solids and Soils/Gravel~~

~~Quality Assurance Objectives~~

~~To ensure that sampling is conducted in a representative manner on a waste-stream basis for waste containers containing homogeneous solids and soil/gravel, samples must be collected randomly in both the horizontal and vertical planes of each container's waste. For waste containers that contain homogeneous solids and soil/gravel in smaller containers (e.g., 1 gal [4.0 L] poly bottles) within the waste container, one randomly chosen smaller container must be sampled from each container.~~

~~Precision~~

~~Sampling precision must be determined by collecting and sampling field duplicates (e.g., co-located cores or co-located samples as described in Permit Attachment C1-2b(1)) once per sampling batch or once per week during sampling operations, whichever is more frequent. A sampling batch is a suite of homogeneous solids and soil/gravel samples collected consecutively using the same sampling equipment within a specific time period. A sampling batch can be up to 20 samples (excluding field QC samples), all of which must be collected within 14 days of the first sample in the batch. The Permittees shall require the Site Project Manager to calculate and report the RPD between co-located core/samples.~~

~~The recommended method for establishing acceptance criteria for co-located cores and co-located samples is the F-test method because the F-Test: 1) does not require potentially arbitrary groupings into batches, 2) is based on exact distributions, and 3) is more likely to detect a change in the process. When a sufficient number of samples are collected (25 to 30 pairs of co-located cores or samples), control charts of the RPD will be developed for each constituent and for each waste matrix or waste type (e.g., pyrochemical salts or organic sludges). The limits for the control chart will be three standard deviations above or below the average RPD. Once constructed, RPDs for additional co-located pairs will be compared with the control chart to determine whether or not the co-located cores are acceptable. Periodically, the control charts will be updated using all available data.~~

~~The statistical test will involve calculating the variance for co-located cores and samples by pooling the variances computed for each pair of duplicate results. The variance for the waste stream will be computed excluding any data from containers with co-located cores, because the test requires the variance estimates to be independent. All data must be transformed to normality prior to computing variances and performing the test. The test hypothesis is evaluated using the F-distribution and the method for testing the difference in variances.~~

~~Accuracy~~

~~Sampling accuracy through the use of standard reference materials shall not be measured. Because waste containers containing homogeneous solids and soil/gravel with known quantities of analytes are not available, sampling accuracy cannot be determined. However, sampling methods and requirements described are designed to minimize sample degradation and hence maximize sampling accuracy.~~

~~Sampling accuracy as a function of sampling cross-contamination will be measured. Equipment blanks will be collected at a frequency of once per equipment cleaning batch. Corrective actions must be taken if the blank exceeds three times the MDLs (PRDLs for metals) listed for any of the compounds or analytes listed in Tables C3-4, C3-6, and C3-8. Equipment blanks will be collected from the following equipment types:~~

- ~~Fully assembled coring tools~~
- ~~Liners cleaned separately from coring tools~~
- ~~Miscellaneous sampling equipment that is reused (bowls, spoons, chisels)~~

~~Completeness~~

~~Sampling completeness shall be expressed as the number of valid samples collected as a percent of the total number of samples collected for each waste stream. A valid sample is any sample that is collected from a randomly selected container using randomly selected horizontal and vertical planes in accordance with approved sampling methods. The Permittees shall require participating sampling facilities to achieve a minimum 90 percent completeness.~~

~~Comparability~~

~~Consistent use and application of uniform procedures, sampling equipment, and measurement units must ensure that sampling operations are comparable. Consistent application of data usability criteria will also ensure comparability. In addition, the Permittees shall require laboratories analyzing samples to successfully participate in the PDP (DOE, 2005).~~

~~Representativeness~~

~~Specific steps to ensure the representativeness of samples include the following for both waste containers and smaller containers:~~

- ~~Coring tools and sampling equipment must be clean prior to sampling.~~
- ~~The entire depth of the waste minus a site-defined approved safety factor must be cored, and the core collected must have a length greater than or equal to 50 percent of the depth of the waste. This is called the core recovery and is calculated as follows:~~

$$\text{Core recovery (percent)} = \frac{y}{x} \times 100 \qquad \text{(C3-10)}$$

~~where~~

~~x = the depth of the waste in the container~~

~~y = the length of the core collected from the waste.~~

~~Coring operations and tool selection should be designed to minimize alteration of the in-place waste characteristics. Minimal waste disturbance must be verified by visually examining the core and describing the observation (e.g., undisturbed, cracked, or pulverized) in the field logbook.~~

~~If core recovery is less than 50 percent of the depth of the waste, a second coring location shall be randomly selected. The core with the best core recovery shall be used for sample collection.~~

~~One randomly selected container within a container will be chosen if the container contains individual waste containers.~~

C3-~~4~~2 Non Destructive Examination Methods

Quality Assurance Objectives

The QAOs for non destructive examination (**NDE**) are detailed in this section. NDE can be either radiography or visual examination (**VE**). If the QAOs described below are not met, then corrective action shall be taken. It should be noted that NDE ~~does not have a specific MDL because it~~ is primarily a qualitative determination. The objective of NDE for the program is to ~~determine the physical waste form~~verify that the physical form of the waste matches the waste stream description as determined by AK and~~,~~ the absence of prohibited items~~, and additional waste characterization techniques that may be used based on the Summary Category Groups (i.e., S3000, S4000, S5000)~~. The Permittees shall require each site to describe all activities required to achieve these objectives in the site quality assurance project plan (**QAPjP**) and standard operating procedures (**SOP**).

C3-~~4a~~2a Radiography

Data to meet these objectives must be obtained from a video and audio recorded scan provided by trained radiography operators at the sites. Results must also be recorded on a radiography data form. The precision, accuracy, completeness, and comparability objectives for radiography data are presented below.

Precision

Precision is maintained by reconciling any discrepancies between two radiography operators with regard to identification of the waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases through independent replicate scans and independent observations. Additionally, the precision of radiography is verified prior to use by tuning precisely enough to demonstrate compliance with QAOs through viewing an image test pattern.

Accuracy

Accuracy is obtained by using a target to tune the image for maximum sharpness and by requiring operators to successfully identify 100 percent of the items required to meet the DQOs for radiography specified in Permit Attachment C, Section C-4a(1) in a training container during their initial qualification and subsequent requalification.

Completeness

A video and audio media recording of the radiography examination and a validated radiography data form will be obtained for 100 percent of the waste containers subject to radiography. All video and audio media recordings and radiography data forms will be subject to validation as indicated in Section C3-~~10~~4.

Comparability

The comparability of radiography data from different operators shall be enhanced by using standardized radiography procedures and operator qualifications.

C3-~~4b~~2b Visual Examination

Results must be recorded on a VE data form. The precision, accuracy, completeness, and comparability objectives for VE data are presented below.

Precision

Precision is maintained by reconciling any discrepancies between the operator and the independent technical reviewer with regard to identification of waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases.

Accuracy

Accuracy is maintained by requiring operators to pass a comprehensive examination and demonstrate satisfactory performance in the presence of the VE expert during their initial qualification. VE operators shall be requalified every two years.

Completeness

A validated VE data form will be obtained for 100 percent of the waste containers subject to VE.

Comparability

The comparability of VE data from different operators shall be enhanced by using standardized VE procedures and operator qualifications.

~~C3-5 Gas Volatile Organic Compound Analysis~~

~~Quality Assurance Objectives~~

~~The development of data quality objective (**DQOs**) specifically for this program has resulted in the QAOs listed in Table C3-2. The specified QAOs represent the required quality of data necessary to draw valid conclusions regarding program objectives. WAP-required limits, such as the program required quantitation limits (**PRQL**) associated with VOC analysis, are specified to ensure that the analytical data collected satisfy the requirements of all data users. A summary of the Quality Control Samples and the associated acceptance criteria is included in Table C3-3. Key data-quality indicators for laboratory measurements are defined below.~~

~~Precision~~

~~Precision shall be assessed by analyzing laboratory duplicates and replicate analyses of laboratory-control samples and PDP blind-audit samples. Results from measurements on these samples must be compared to the criteria listed in Table C3-2. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Accuracy~~

~~Accuracy as %R shall be assessed for the laboratory operations by analyzing PDP blind-audit samples and laboratory control samples. Results from these measurements must be compared to the criteria listed in Table C3-2. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Calibration~~

~~GC/MS Tunes, Initial Calibrations, and Continuing Calibration will be performed and evaluated using the procedures and criteria specified in Table C3-3. These criteria will be used to demonstrate acceptable calibration and to trigger corrective action when control limits are exceeded.~~

~~Method Detection Limit~~

~~MDLs shall be expressed in nanograms for VOCs and must be less than or equal to those listed in Table C3-2. MDLs shall be determined based on the method described in Section C3-1. The detailed procedures for MDL determination shall be included in site SOPs.~~

~~Program Required Quantitation Limit~~

~~Laboratories must demonstrate the capability to quantitate analytes at or below the PRQLs given in Table C3-2. Laboratories shall set the concentration of at least one calibration standard below the PRQL. The detailed procedures for PRQL demonstration shall be included in laboratory SOPs.~~

~~Completeness~~

~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. A composited sample is treated as one sample for the purposes of completeness, because only one sample is run through the analytical instrument. Valid results are defined as results that meet the data usability criteria based on application of the Quality Control Criteria specified in Tables C3-2 and C3-3; and meet the detection limit, calibration representativeness, and comparability criteria within this section. The Permittees shall require that participating laboratories meet the completeness criteria specified in Table C3-2.~~

~~Comparability~~

~~For VOC analysis, data generated through analysis of samples from different sites shall be comparable. The Permittees shall require each site to achieve comparability by using standardized methods and traceable standards and by requiring all sites to successfully participate in the PDP (DOE, 2003).~~

~~Representativeness~~

~~Representativeness for VOC analysis shall be achieved by collecting sufficient numbers of samples using clean sampling equipment that does not introduce sample bias. Samples must be collected as described in Permit Attachment C1.~~

~~C3-6 – Total Volatile Organic Compound Analysis~~

~~Quality Assurance Objectives~~

~~The development of DQOs specifically for this program has resulted in the QAOs listed in Table C3-4. The specified QAOs represent the required quality of data necessary to draw valid conclusions regarding program objectives. WAP-required limits, such as the PRQL associated with VOC analysis, are specified to ensure that the analytical data collected satisfy the requirements of all data users. Key data-quality indicators for laboratory measurements are defined below.~~

~~Precision~~

~~Precision shall be assessed by analyzing laboratory duplicates or matrix spike duplicates, replicate analyses of laboratory control samples, and PDP blind-audit samples. Results from measurements on these samples must be compared to the criteria listed in Table C3-4. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Accuracy~~

~~Accuracy as %R shall be assessed for the laboratory operations by analyzing laboratory control samples, matrix spikes, surrogate compounds, and PDP blind-audit samples. Results from these measurements for matrix spikes samples must be compared to the %R criteria listed in Table C3-4. Results for surrogates and internal standards are evaluated as specified in the SW-846 method (EPA 1996) or Table C3-5. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Laboratory blanks shall be assessed to determine possible laboratory contamination and are evaluated as specified in Table C3-5. These QC measurements will be used to demonstrate acceptable levels of laboratory contamination and to trigger corrective action when control limits are exceeded.~~

~~Calibration~~

~~GC/MS Tunes, Initial Calibrations, and Continuing Calibration will be performed and evaluated using the procedures and criteria specified in Table C3-5 and the SW-846 method (EPA 1996). These criteria will be used to demonstrate acceptable calibration and to trigger corrective action when control limits are exceeded.~~

~~Method Detection Limit~~

~~MDLs shall be expressed in milligrams per kilogram (mg/kg) for VOCs and must be less than or equal to those listed in Table C3-4. The detailed procedures for MDL determination shall be included in site SOPs.~~

~~Program Required Quantitation Limit~~

~~Laboratories must demonstrate the capability to quantitate analytes in samples at or below the PRQLs given in Table C3-4. Laboratories shall set the concentration of at least one calibration standard below the PRQL. The detailed procedures for PRQL demonstration shall be included in laboratory SOPs.~~

~~Completeness~~

~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. Valid results are defined as results that meet the data usability criteria based upon application of the Quality Control Criteria specified in Tables C3-4 and C3-5 and meet the calibration, detection limit, representativeness, and comparability criteria within this section. Participating laboratories must meet the completeness criteria specified in Table C3-4.~~

~~Comparability~~

~~For VOC analysis, data generated through analysis of samples from different sites shall be comparable. The Permittees shall require sites to achieve comparability by using standardized SW-846 sample preparation and methods that meet the QAO requirements in Tables C3-4 and C3-5, traceable standards, and by requiring all sites to successfully participate in the PDP (DOE, 2005). Generator/storage sites may use the most recent version of SW-846. Any changes to SW-846 methodology that results in the elimination of sample preparation or analytical methods in use at generator/storage sites must be addressed as a corrective action to address the comparability of data before and after the SW-846 modification.~~

~~Representativeness~~

~~Representativeness for VOC analysis shall be achieved by collecting unbiased samples. Samples must be collected as described in Permit Attachment C1.~~

~~C3-7 Total Semivolatile Organic Compound Analysis~~

~~Quality Assurance Objectives~~

~~The development of DQOs specifically for this program has resulted in the QAOs listed in Table C3-6. The specified QAOs represent the required quality of data necessary to draw valid conclusions regarding program objectives. WAP-required limits, such as the PRQLs, are specified to ensure that the analytical data collected satisfy the requirements of all data users. A summary of Quality Control Samples and associated acceptance criteria for this analysis is included in Table C3-7. Key data-quality indicators for laboratory measurements are defined below.~~

~~Precision~~

~~Precision shall be assessed by analyzing laboratory duplicates or matrix spike duplicates, replicate analyses of laboratory control samples, and PDP blind-audit samples. Results from measurements on these samples must be compared to the criteria listed in Table C3-6. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Accuracy~~

~~Accuracy as %R shall be assessed for the laboratory operations by analyzing laboratory control samples, matrix spikes, surrogate compounds, and PDP blind-audit samples. Results from these measurements for matrix spikes samples must be compared to the %R criteria listed in Table C3-6. Results for surrogates and internal standards are evaluated as specified in the SW-846 method (EPA 1996) or Table C3-7. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Laboratory blanks shall be assessed to determine possible laboratory contamination and are evaluated as specified in Table C3-7. These QC measurements will be used to demonstrate acceptable levels of laboratory contamination and to trigger corrective action when control limits are exceeded.~~

~~Calibration~~

~~GC/MS Tunes, Initial Calibrations, and Continuing Calibration will be performed and evaluated using the procedures and criteria specified in Table C3-7 and the SW-846 method (EPA 1996). These criteria will be used to demonstrate acceptable calibration and to trigger corrective action when control limits are exceeded.~~

~~Method Detection Limit~~

~~MDLs shall be expressed in mg/kg for SVOCs and must be less than or equal to those listed in Table C3-6. The detailed procedures for MDL determination shall be included in site SOPs.~~

~~Program Required Quantitation Limit~~

~~Laboratories must demonstrate the capability to quantitate analytes in samples at or below the PRQLs given in Table C3-6. Laboratories shall set the concentration of at least one calibration standard below the PRQL. The detailed procedures for PRQL demonstration shall be included in laboratory SOPs.~~

~~Completeness~~

~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. Valid results are defined as results that meet the data usability criteria based on application of the Quality Control Criteria specified in Tables C3-6 and C3-7 and meet the detection limit, calibration, representativeness, and comparability criteria within this section. The Permittees shall require participating laboratories to meet the level of completeness specified in Table C3-6.~~

~~Comparability~~

~~For SVOC analysis, data generated through analysis of samples from different sites shall be comparable. The Permittees shall require sites to achieve comparability by using standardized SW-846 sample preparation and methods that meet the QAO requirements in Tables C3-6 and C3-7, traceable standards, and by requiring all sites to successfully participate in the PDP (DOE, 2005). Generator/storage sites may use the most current version of SW-846 if the methods are consistent with QAO requirements. Any changes to SW-846 methodology that results in the elimination of sample preparation or analytical methods in use at generator/storage sites must be addressed as a corrective action to address the comparability of data before and after the SW-846 modification.~~

~~Representativeness~~

~~Representativeness for SVOC analysis shall be achieved by collecting unbiased samples. Samples must be collected as described in Permit Attachment C1.~~

~~C3-8 Total Metal Analysis~~

~~Quality Assurance Objectives~~

~~The development of DQOs for the program has resulted in the QAOs listed in Table C3-8. The specified QAOs represent the required quality of data necessary to draw valid conclusions regarding program objectives. WAP-required limits, such as the PRQLs associated with metal analysis, are specified to ensure that the analytical data collected satisfy the requirements of all data users. A summary of Quality Control Samples and the associated acceptance criteria for this analysis is provided in Table C3-9. Key data-quality indicators for laboratory measurements are defined below.~~

~~Precision~~

~~Precision shall be assessed by analyzing laboratory sample duplicates or laboratory matrix spike duplicates, replicate analyses of laboratory control samples, and PDP blind-audit samples. Results from measurements on these samples must be compared to the criteria listed~~

~~in Table C3-8. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Accuracy~~

~~Accuracy shall be assessed through the analysis of laboratory matrix spikes, PDP blind-audit samples, serial dilutions, interference check samples, and laboratory control samples. Results from these measurements must be compared to the criterion listed in Table C3-8 and C3-9. These QC measurements will be used to demonstrate acceptable method performance and to trigger corrective action when control limits are exceeded.~~

~~Laboratory blanks and calibration blanks shall be assessed to determine possible laboratory contamination and are evaluated as specified in Table C3-9. These QC measurements will be used to demonstrate acceptable levels of laboratory contamination and to trigger corrective action when control limits are exceeded.~~

~~Calibration~~

~~Mass Tunes (for ICP-MS only), Standards Calibration, Initial Calibration verifications, and Continuing Calibrations will be performed and evaluated using the procedures and criteria specified in Table C3-9 and the SW-846 method (EPA 1996). These criteria will be used to demonstrate acceptable calibration and to trigger corrective action when control limits are exceeded.~~

~~Program Required Detection Limits~~

~~PRDLs, expressed in units of micrograms per L (µg/L), are the maximum values for instrument detection limits (**IDL**) permissible for program support under the WAP. IDLs must be less than or equal to the PRDL for the method used to quantitate a specific analyte. Any method listed in Table C-5 of the Waste Analysis Plan (Permit Attachment C) may be used if the IDL meets this criteria. For high concentration samples, an exception to the above requirements may be made in cases where the sample concentration exceeds five times the IDL of the instrument being used. In this case, the analyte concentration may be reported even though the IDL may exceed the PRDL. IDLs shall be determined semiannually (i.e., every six months). Detailed procedures for IDL determination shall be included in laboratory SOPs.~~

~~Program Required Quantitation Limit~~

~~The Permittees shall require participating laboratories to demonstrate the capability of analyte quantitation at or below the PRQLs in units of mg/kg wet weight (given in Table C3-8). The PRDLs are set an order of magnitude less than the PRQLs (assuming 100 percent solid sample diluted by a factor of 100 during preparation). The Permittees shall require participating laboratories to set the concentration of at least one QC or calibration standard at or below the solution concentration equivalent of the PRQL. Detailed calibration procedures shall be included in site SOPs.~~

~~Completeness~~

~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. Valid results are~~

~~defined as results that meet the data usability criteria based upon application of the Quality Control Criteria specified in Tables C3-8 and C3-9 and meet the detection limit, calibration, representativeness, and comparability criteria within this section. The Permittees shall require participating laboratories to meet the completeness specified in Table C3-8.~~

~~Comparability~~

~~For metals analysis, data generated through analysis of samples from different sites shall be comparable. Comparability will be achieved by using standardized SW-846 sample preparation and methods that meet QAO requirements in Tables C3-8 and C3-9, demonstrating successful participation in the PDP (DOE, 2005), and use of traceable standards. Generator/storage sites may use the most recent SW-846 update. Any changes to SW-846 methodology that results in the elimination of sample preparation or analytical methods in use at generator/storage sites must be addressed as a corrective action to address the comparability of data before and after the SW-846 modification.~~

~~Representativeness~~

~~Representativeness for metals analysis shall be achieved by the collection of unbiased samples and the preparation of samples in the laboratory using representative and unbiased methods. Samples must be collected as described in Permit Attachment C1.~~

C3-~~9~~3 Acceptable Knowledge

Acceptable knowledge documentation provides primarily qualitative information that cannot be assessed according to specific data quality goals that are used for ~~analytical~~ quantitative techniques. ~~QAOs for analytical results are described in terms of precision, accuracy, completeness, comparability, and representativeness. Appropriate analytical and testing results may be used to augment the characterization of wastes based on acceptable knowledge.~~ To ensure that the acceptable knowledge process is consistently applied, ~~The~~ the Permittees shall require sites to comply with the following data quality requirements for acceptable knowledge documentation:

- Precision - ~~Precision is the agreement among a set of replicate measurements without assumption of the knowledge of a true value.~~ The qualitative determinations, such as compiling and assessing acceptable knowledge documentation, do not lend themselves to statistical evaluations of precision. However, the acceptable knowledge information will be addressed by the independent review of acceptable knowledge information during internal and external audits.

- Accuracy - ~~Accuracy is the degree of agreement between an observed sample result and the true value.~~ The percentage of waste containers which require reassignment to a new waste matrix code and/or designation of different hazardous waste numbers based on ~~sampling and analysis~~testing data and discrepancies identified by the Permittees during waste confirmation will be reported as a measure of acceptable knowledge accuracy.

- Completeness - ~~Completeness is an assessment of the number of waste streams or number of samples collected to the number of samples determined to be~~

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~~useable through the data validation process.~~ The acceptable knowledge record must contain 100 percent of the required information (Permit Attachment C4-3). The usability of the acceptable knowledge information will be assessed for completeness during audits.

- Comparability - ~~Data are considered comparable when one set of data can be compared to another set of data.~~ Comparability is ensured through sites meeting the training requirements and complying with the minimum standards outlined for procedures that are used to implement the acceptable knowledge process. All sites must assign hazardous waste numbers in accordance with Permit Attachment C4-3b and provide this information regarding its waste to other sites who store or generate a similar waste stream.

- Representativeness - ~~Representativeness expresses the degree to which sample data accurately and precisely represent characteristics of a population.~~ Representativeness is a qualitative parameter that will be satisfied by ensuring that the process of obtaining, evaluating, and documenting acceptable knowledge information is performed in accordance with the minimum standards established in Permit Attachment C4. Sites also must assess and document the limitations of the acceptable knowledge information used to assign hazardous waste numbers (e.g., purpose and scope of information, date of publication, type and extent to which waste parameters are addressed).

The Permittees shall require each generator/storage site to comply with the nonconformance notification and reporting requirements of Section C3-~~13~~ 7 if the results of ~~sampling and analysis~~testing specified in Permit Attachment C are inconsistent with acceptable knowledge documentation.

The Permittees shall require each site to address quality control by tracking its performance with regard to the use of acceptable knowledge by: 1) assessing the frequency of inconsistencies among information, and 2) documenting acceptable knowledge inconsistencies identified through radiography~~,~~ and visual examination~~, headspace gas analyses, and solidified waste analyses~~. In addition, the acceptable knowledge process and waste stream documentation must be evaluated through internal assessments by generator/storage site quality assurance organizations and assessments by auditors external to the organization (i.e., the Permittees).

C3-~~10~~4 Data Review, Validation, and Verification Requirements

Procedures shall be developed for the review, validation, and verification of data at the data generation level; the validation and verification of data at the project level; and the verification of data at the Permittee level. Data review determines if raw data have been properly collected and ensures raw data are properly reduced. Data validation verifies that the data reported satisfy the requirements of this WAP and is accompanied by signature release. Data verification authenticates that data as presented represent the ~~sampling and analysis~~testing activities as performed and have been subject to the appropriate levels of data review. The requirements presented in this section ensure that WAP records furnish documentary evidence of quality.

The Permittees shall require the sites to generate the following Batch Data Reports for data validation, verification, and quality assurance activities:

- A Testing Batch Data Report or equivalent includes all data pertaining to radiography or visual examination for up to 20 waste containers without regard to waste matrix. Table C3-~~11~~ 3 lists all of the information required in Testing Batch Data Reports (identified with an "X") and other information that is necessary for data validation, but is optional in Testing Batch Data Reports (identified with an "O").

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~~A Sampling Batch Data Report or equivalent includes all sample collection data pertaining to a group of no more than 20 headspace gas or homogeneous waste samples that were collected for chemical analysis. Table C3-12 lists all of the information required in Sampling Batch Data Reports (identified with an "X") and other information that is necessary for data validation, but is optional in Sampling Batch Data Reports (identified with an "O").~~

~~An Analytical Batch Data Report or equivalent includes analytical data from the analysis of TRU-mixed waste for up to 20 headspace gas or homogeneous waste samples. Analytical Batch Data Reports or equivalent that contain results for composited headspace gas samples must contain sufficient information to identify the containers that were composited for each composite sample and the sample volume that was taken from each waste container. Because Analytical Batch Data Reports are generated based on the number of samples analyzed, an Analytical Batch Data Report may contain results that are applicable to more than 20 containers depending on how many composite samples are part of the report, but may not exceed a total of 20 samples analyzed. Table C3-13 lists all of the information required in Analytical Batch Data Reports (identified with an "X") and other information that is necessary for data validation, but is optional in Analytical Batch Data Reports (identified with an "O").~~

~~Raw analytical data need not be included in Analytical Batch Data Reports, but must be maintained in the site project files and be readily available for review upon request. Raw data may include all analytical bench sheet and instrumentation readouts for all calibration standard results, sample data, QC samples, sample preparation conditions and logs, sample run logs, and all re-extraction, re-analysis, or dilution information pertaining to the individual samples. Raw data may also include calculation records and any qualitative or semi-quantitative data collected for a sample and that has been recorded on a bench sheet or in a log book.~~

~~An On-line Batch Data Report or equivalent contains the combined information from the Sampling Batch Data Report and Analytical Batch Data Report that is relevant to the on-line method used.~~

C3-~~10a~~4a Data Generation Level

The following are minimum requirements for raw data collection and management which the Permittees shall require for each site:

- All raw data shall be signed and dated in reproducible ink by the person generating it. Alternately, unalterable electronic signatures may be used.

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- All data must be recorded clearly, legibly, and accurately in field ~~and laboratory~~ records ~~(bench sheets, logbooks), and include applicable sample identification numbers (for sampling and analytical labs)~~.

- All changes to original data must be lined out, initialed, and dated by the individual making the change. A justification for changing the original data may also be included. Original data must not be obliterated or otherwise disfigured so as not to be readable. Data changes shall only be made by the individual who originally collected the data or an individual authorized to change the data.

- All data must be transferred and reduced from field ~~and laboratory~~ records completely and accurately.

- All field ~~and laboratory~~ records must be maintained as specified in Table C-~~6~~ 2 of Attachment C.

- Data must be organized into a standard format for reporting purposes (Batch Data Report), as outlined in specific testing ~~sampling and analytical~~ procedures.

- All electronic and video data must be stored appropriately to ensure that waste container~~,~~ ~~sample,~~ and associated QC data are readily retrievable. In the case of classified information, additional security provisions may apply that could restrict retrievability. The additional security provisions will be documented in generator/storage site procedures as outlined in the QAPjP in accordance with prevailing classified information security standards.

Data review, validation, and verification at this level involves scrutiny and signature release from qualified independent technical reviewer(s) not involved in the generation or recording of the data under review, as specified below. Individuals conducting this data review, validation, and verification must use checklists that address all of the items included in this section. ~~Checklists must contain or reference tables showing the results of sampling, analytical or on-line batch QC samples, if applicable. Checklists must reflect review of all QC samples and quality assurance objective categories in accordance with criteria established in Tables C3-2 through C3-9 (as applicable to the methods validated).~~ Completed checklists must be forwarded with Batch Data Reports to the project level. ~~Analytical raw data must be available and reviewed by the data generation level reviewer.~~

C3-~~10a~~4a(1) Independent Technical Review

The independent technical review ensures by review of raw data that data generation and reduction are technically correct; calculations are verified correct; deviations are documented; and QA/QC results are complete, documented correctly, and compared against WAP criteria. This review validates and verifies all of the work documented by the originator.

One hundred percent of the Batch Data Reports must receive an independent technical review by a trained and qualified individual who was not involved in the generation or recording of the data under review. This review shall be performed by an individual other than the data generator who is qualified to have performed the initial work. The independent technical review must be performed as soon as practicably possible in order to determine and correct negative quality

trends in the ~~sampling or analytical~~testing process. However at a minimum, the independent technical review must be performed before any waste associated with the data reviewed is managed, stored, or disposed at WIPP~~, unless the data are being obtained from waste sampling and analysis as containers are being retrieved or generated after initial WSPF approval as described in Attachment C2, Section C2-1~~. The reviewer(s) must release the data as evidenced by signature, and as a consequence ensure the following:

- Data generation and reduction were conducted in a technically correct manner in accordance with the methods used (procedure with revision). Data were reported in the proper units and correct number of significant figures.

- Calculations have been verified by a valid calculation program, a spot check of verified calculation programs, and/or 100 percent check of all hand calculations. Values that are not verifiable to within rounding or significant difference discrepancies must be rectified prior to completion of independent technical review.

- The data have been reviewed for transcription errors.

- The testing~~, sampling, or analytical~~ data QA documentation for Batch Data Reports is complete and includes, as applicable, raw data, ~~DAC and equilibrium calculations and times,~~ calculation records, ~~chain-of-custody (**COC**) forms,~~ calibration records (or references to an available calibration package)~~, QC sample results, and copies or originals of gas canister sample tags~~. Corrective action will be taken to ensure that all Batch Data Reports are complete and include all necessary raw data prior to completion of the independent technical review.

~~QC sample results are within established control limits, and if not, the data have been appropriately qualified in accordance with data usability criteria. Data outside of established control limits will be qualified as appropriate, assigned an appropriate qualifier flag, discussed in the case narrative, and included as appropriate in calculations for completeness. QC criteria that were not met are documented.~~

~~Reporting flags (Table C3-14) were assigned correctly.~~

~~Sample holding time and preservation requirements were met, or exceptions documented.~~

- Radiography tapes have been reviewed (independent observation) on a waste container basis at a minimum of once per testing batch or once per day of operation, whichever is less frequent (Attachment C1, Section C1-~~3~~1). The radiography tape will be reviewed against the data reported on the radiography form to ensure that the data are correct and complete.

~~Field sampling records are complete. Incomplete or incorrect field sampling records will be subject to resubmittal prior to completion of the independent technical review.~~

- QAOs have been met according to the methods outlined in Sections C3-2 ~~through~~ and C3-~~9~~3.

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C3-~~10b~~4b Project Level

Data validation and verification at this level involves scrutiny and signature release from the Site Project Manager (or designee). The Permittees shall require each site to meet the following minimum requirements for each waste container. Any nonconformance identified during this process shall be documented on a nonconformance report (Section C3-~~13~~7).

The Site Project Manager shall ensure that a repeat of the data generation level review, validation, and verification is performed on the data for a minimum of one randomly chosen waste container quarterly (every three months). This exercise will document that the data generation level review, validation, and verification is being performed according to implementing procedures.

C3-~~10b~~4b(1) Site Project Manager Review

The Site Project Manager Review is the final validation that all of the data contained in Batch Data Reports from the data generation level are complete and have been properly reviewed as evidenced by signature release and completed checklists.

One hundred percent of the Batch Data Reports must have Site Project Manager signature release. At a minimum, the Site Project Manager signature release must be performed before any waste associated with the data reviewed is managed, stored, or disposed at WIPP~~, unless the data are being obtained from waste sampling and analysis as containers are being retrieved or generated as described in Permit Attachment C2, Section C2-1~~. This signature release must ensure the following:

- ~~The validity of the DAC assignment made at the data generation level based upon an assessment of the data collection and evaluation necessary to make the assignment.~~

- Testing batch QC checks (e.g., replicate scans, measurement system checks) were properly performed. Radiography data are complete and acceptable based on evidence of videotape review of one waste container per day or once per testing batch, whichever is less frequent, as specified in Permit Attachment C1, Section C1-~~3~~1.

~~Sampling batch QC checks (e.g., equipment blanks, field duplicates, field reference standards) were properly performed, and meet the established QAOs and are within established data usability criteria.~~

~~Analytical batch QC checks (e.g., laboratory duplicates, laboratory blanks, matrix spikes, matrix spike duplicates, laboratory control samples) were properly performed and meet the established QAOs and are within established data usability criteria.~~

~~On-line batch QC checks (e.g., field blanks, on-line blanks, on-line duplicates, on-line control samples) were properly performed and meet the established QAOs and are within established data usability criteria.~~

- ~~Proper procedures were followed to ensure representative samples of headspace gas and homogeneous solids and soil/gravel were taken.~~

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- Data generation level independent technical review, validation, and verification have been performed as evidenced by the completed review checklists and appropriate signature releases.

- Independent technical reviewers were not involved in the generation or recording of the data under review.

- Batch data review checklists are complete.

- Batch Data Reports are complete and data are properly reported (e.g., data are reported in the correct units, and with the correct number of significant figures~~, and with qualifying flags~~).

- Verify that data are within established data assessment criteria and meet all applicable QAOs (Sections C3-2 ~~through~~ and C3-~~9~~3).

C3-~~10b~~4b(2) Prepare Site Project Manager Summary and Data Validation Summary

To document the project-level validation and verification described above, the Permittees shall require each Site Project Manager (or designee) to prepare a Site Project Manager Summary and a Data Validation Summary. These reports may be combined to eliminate redundancy. The Site Project Manager Summary includes a validation checklist for each Batch Data Report. Checklists for the Site Project Manager Summary must be sufficiently detailed to validate all aspects of a Batch Data Report that affect data quality. The Data Validation Summary provides verification that, on a per waste container ~~or sample~~ basis as evidenced by Batch Data Report reviews, all data have been validated in accordance with the site QAPjP. The Data Validation Summary must identify each Batch Data Report reviewed (including all waste container numbers), describe how the validation was performed and whether or not problems were detected (e.g., nonconformance reports), and include a statement indicating that all data are acceptable. Summaries must include release signatures.

~~Once the data have received project-level validation and verification or when the Site Project Manager decides the sample no longer needs to be retained, the Site Project Manager must ensure that the laboratory is notified. Samples must be retained by the laboratory until this notification is received. Gas sample canisters may then be released from storage for cleaning, recertification, and subsequent reuse. Sample tags must be removed and retained in the project files before recycling the canisters. If the Site Project Manager requests that samples or canisters be retained for future use (e.g., an experimental holding time study), the same sample identification and COC forms shall be used and cross-referenced to a document which specifies the purpose for sample or canister retention.~~

C3-~~10b~~4b(3) Prepare Waste Stream Characterization Package

In the event the Permittees request detailed information on a waste stream, the Site Project Manager will provide a Waste Stream Characterization Package. The Site Project Manager must ensure that the Waste Stream Characterization Package (Section C3-12b(3)) will support waste characterization determinations.

C3-~~10c~~4c Permittee Level

The final level of data verification occurs at the Permittee level and must, at a minimum, consist of reviewing a sample of the Batch Data Reports during audits of generator/storage sites ~~and DOE approved laboratories~~ to verify completeness. During such audits, DOE is responsible for the verification that Batch Data Reports include the following:

- Project-level signature releases
- Listing of all waste containers being presented in the report
- Listing of all testing, ~~sampling, and analytical~~ batch numbers associated with each waste container being reported in the package

~~Analytical Batch Data Report case narratives~~

- Site Project Manager Summary
- Data Validation Summary

~~Complete summarized qualitative and quantitative data for all waste containers with data flags and qualifiers.~~

For each Waste Stream Profile Form (**WSPF**) submitted for approval, DOE must verify that each submittal (i.e., WSPF and Characterization Information Summary) is complete and notify the originating site in writing of the WSPF approval. DOE will maintain the data as appropriate for use in the regulatory compliance programs. For subsequent shipments made after the initial WSPF approval, the verification will also include WWIS internal limit checks (Attachment C, Section C-5a(1)).

C3-~~11~~5 Reconciliation with Data Quality Objectives

Reconciling the results of waste testing ~~and analysis~~ with the DQOs provides a way to ensure that data will be of adequate quality to support the regulatory compliance programs. Reconciliation with the DQOs will take place at both the project level and the Permittees' level. At the project level, reconciliation will be performed by the Site Project Manager, while at the Permittees' level, reconciliation will be performed as described below.

C3-~~11a~~5a Reconciliation at the Project Level

The Permittees shall require each Site Project Manager to ensure that all data generated and used in decision making meet the DQOs provided in Section C-4a(1) of Permit Attachment C. To do so, the Site Project Manager must assess whether data of sufficient type, quality, and quantity have been collected. ~~The Site Project Manager must determine if the variability of the data set is small enough to provide the required confidence in the results. The Site Project Manager must also determine if, based on the desired error rates and confidence levels, a sufficient number of valid data points have been determined (as established by the associated completeness rate for each sampling and analytical process). In addition, the Site Project Manager must document that random sampling of containers was performed for the purposes of waste stream characterization.~~

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For each waste stream characterized, the Permittees shall require each Site Project Manager to determine if sufficient data have been collected to determine the following WAP-required waste parameters, as applicable:

- Waste matrix code
- Waste material parameter weights
- If each waste container of waste contains TRU radioactive waste

~~Mean concentrations, $UCL_{90}$ for the mean concentrations, standard deviations, and the number of samples collected for each VOC in the headspace gas of waste containers in the waste stream~~

~~Mean concentrations, $UCL_{90}$ for the mean concentrations, standard deviations, and number of samples collected for VOCs, SVOCs, and metals in the waste stream~~

- Whether the waste stream exhibits a toxicity characteristic (**TC**) under 40 CFR Part 261, Subpart C
- Whether the waste stream contains listed waste found in 20.4.1.200 NMAC incorporating 40 CFR Part 261, Subpart D

Whether the waste stream can be classified as hazardous or nonhazardous ~~at the 90-percent confidence level~~

~~Whether an appropriate packaging configuration and DAC were applied and documented in the headspace gas sampling documentation, and whether the drum age was met prior to sampling.~~

~~Whether all TICs were appropriately identified and reported in accordance with the requirements of Section C3-1 prior to submittal of a WSPF for a waste stream or waste stream lot.~~

- Whether the overall completeness, comparability, and representativeness QAOs were met for each of the ~~analytical and~~ testing procedures as specified in Sections C3-2 ~~through~~ and C3-~~9~~ 3 prior to submittal of a WSPF for a waste stream or waste stream lot.

~~Whether the PRQLs for all analyses were met prior to submittal of a WSPF for a waste stream or waste stream lot.~~

If the Site Project Manager determines that insufficient data have been collected to make the determinations listed above, additional data collection efforts must be undertaken. The reconciliation of a waste stream shall be performed, as described in Permit Attachment C4, prior to submittal of WSPF and Characterization Information Summary to the Permittees for that waste stream. The Permittees shall not manage, store, or dispose a TRU mixed waste stream at WIPP unless the Site Project Manager determines that the WAP-required waste parameters listed above have been met for that waste stream.

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~~The statistical procedure presented in Permit Attachment C2 shall be used by participating Site Project Managers to evaluate and report waste characterization data from the analysis of homogeneous solids and soil/gravel. The procedure, which calculates $UCL_{90}$ values, shall be used to assess compliance with the DQOs in Attachment C, Section C-4a(1) as well as with RCRA regulations. The procedure must be applied to all laboratory analytical data for total VOCs, total SVOCs, and total metals. For RCRA regulatory compliance (40 CFR §261.24), data from the analysis of the appropriate metals and organic compounds shall be expressed as toxicity characteristic leaching procedure (**TCLP**) values or results may also be compared to the TC levels expressed as total values. These total values will be considered the regulatory threshold limit (**RTL**) values for the WAP. RTL values are obtained by calculating the weight/weight concentration (in the solid) of a TC analyte that would give the regulatory weight/volume concentration (in the TCLP extract), assuming 100 percent analyte dissolution.~~

C3-~~11b~~5b Reconciliation at the Permittee Level

The Permittees must also ensure that data of sufficient type, quality, and quantity are collected to meet WAP DQOs. The Permittees will ensure sufficient data have been collected to determine if the waste characterization information is adequate to demonstrate the Permittees' compliance with Attachment C, Section C-4a(1). This is performed during the Permittees' review of the WSPF and Characterization Information Summary and is documented by DOE's approval of the WSPF.

C3-~~12~~6 Data Reporting Requirements

Data reporting requirements define the type of information and the method of transmittal for data transfer from the data generation level to the project level and from the project level to the Permittees.

C3-~~12a~~6a Data Generation Level

Data shall be transmitted by hard copy or electronically (provided a hard copy is available on demand) from the data generation level to the project level. Transmitted data shall include all Batch Data Reports and data review checklists. The Batch Data Reports and checklists used must contain all of the information required by the testing~~, sampling, and analytical~~ techniques described in Permit Attachments C1 through C6 , as well as the signature releases to document the review, validation, and verification as described in Section C3-~~10~~4. All Batch Data Reports and checklists shall be in approved formats, as provided in site-specific documentation.

Batch Data Reports shall be forwarded to the Site Project Manager. All Batch Data Reports shall be assigned serial numbers, and each page shall be numbered. The serial number used for Batch Data Reports can be the same as the testing~~, sampling, or analytical~~ batch number.

QA documentation, including raw data, shall be maintained in either testing~~, sampling, and analytical~~ facility files, or site project files for those facilities located on site in accordance with the document storage requirements of site approved site QAPjPs. ~~DOE approved laboratories shall forward testing, sampling, and analytical QA documentation along with Batch Data Reports to the site project office for inclusion in site project files.~~

C3-~~12b~~6b Project Level

The site project office shall prepare a WSPF for each waste stream certified for shipment to WIPP based on information obtained from acceptable knowledge and Batch Data Reports, if applicable. In addition, the site project office must ensure that the Characterization Information Summary and the Waste Stream Characterization Package (when requested by the Permittees) are prepared as appropriate. The Site Project Manager must also verify these reports are consistent with information found in ~~analytical~~ batch reports. Summarized testing~~, sampling, and analytical~~ data are included in the Characterization Information Summary. The contents of the WSPF, Characterization Information Summary, and Waste Stream Characterization Package are discussed in the following sections.

After approval of a WSPF and the associated Characterization Information Summary by DOE, the generator/storage site are required to maintain a cross reference of container identification numbers to each Batch Data Report.

A Waste Stream Characterization Package shall be transmitted by hard copy or electronically from the Site Project Manager to the Permittees when requested.

C3-~~12b~~6b(1) Waste Stream Profile Form

The Waste Stream Profile Form (WSPF, Figure C-1) shall include the following information:

- Generator/storage site name
- Generator/storage site EPA ID
- Date of audit report approval by NMED (if obtained)
- Original generator of waste stream
- Whether waste is Contact-Handled or Remote-Handled
- The Waste Stream WIPP Identification Number
- Summary Category Group
- Waste Matrix Code Group
- Waste Material Parameter Weight Estimates per unit of waste
- Waste stream name
- A description of the waste stream
- Applicable EPA hazardous waste numbers
- Applicable TRUCON codes
- A listing of acceptable knowledge documentation used to identify the waste stream

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- The waste characterization procedures used and the reference and date of the procedure

- Certification signature of Site Project Manager, name, title, and date signed

C3-~~12b~~6b(2) Characterization Information Summary

The Characterization Information Summary shall include the following elements, if applicable:

- Data reconciliation with DQOs

~~Headspace gas summary data listing the identification numbers of samples used in the statistical reduction, the maximum, mean, standard deviation, $UCL_{90}$, RTL, and associated EPA hazardous waste numbers that must be applied to the waste stream.~~

~~Total metal, VOC, and SVOC analytical results for homogeneous solids and soil/gravel (if applicable).~~

~~TIC listing and evaluation.~~

- Radiography and VE summary to document that all prohibited items are absent in the waste and to verify that the physical form of the waste matches the waste stream description as determined by AK (if applicable).

- A justification for the selection of radiography and/or ~~/~~VE as an appropriate method for characterizing the waste.

- A complete listing of all container identification numbers used to generate the WSPF, cross-referenced to each Batch Data Report

- Complete AK summary, including stream name and number, point of generation, waste stream volume (current and projected), generation dates, TRUCON codes, Summary Category Group, Waste Matrix Code(s) and Waste Matrix Code Group, other TWBIR information, waste stream description, areas of operation, generating processes, RCRA determinations, radionuclide information, all references used to generate the AK summary, and any other information required by Permit Attachment C4, Section C4-2b.

- Method for determining Waste Material Parameter Weights per unit of waste.

- List of any AK Sufficiency Determinations requested for the waste stream.

- Certification through acceptable knowledge or testing ~~and/or analysis~~ that any waste assigned the hazardous waste number of U134 (hydrofluoric acid) no longer exhibits the characteristic of corrosivity. This is verified by ensuring that no liquid is present in U134 waste.

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C3-~~12b~~6b(3) Waste Stream Characterization Package

The Waste Stream Characterization Package includes the following information:

- Waste Stream Profile Form (WSPF, Section C3-~~12b~~6b(1))
- Accompanying Characterization Information Summary (Section C3-~~12b~~6b(2))
- Complete AK summary (Section C3-~~12b~~6b(2))
- Batch Data Reports supporting the characterization of the waste stream and any others requested by the Permittees
- Raw ~~analytical~~ testing data requested by the Permittees

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C3-~~12b~~6b(4) WIPP Waste Information System (**WWIS**) Data Reporting

The WWIS Data Dictionary includes all of 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* (DOE, 2009). ~~If a container was part of a composite headspace gas sample, the analytical results from the composite sample must be assigned as the container headspace gas data results, including associated TICs, for every waste container associated with the composite sample.~~

C3-~~13~~7 Nonconformances

The Permittees shall require the status of work and the WAP activities at participating generator/storage sites to be monitored and controlled by the Site Project Manager. This monitoring and control shall include nonconformance identification, documentation, and reporting.

The nonconformances and corrective action processes specified in this section describe procedures between the Permittees and the generator/storage sites.

Nonconformances

Nonconformances are uncontrolled and unapproved deviations from an approved plan or procedure. Nonconforming items and activities are those that do not meet the WAP requirements, procurement document criteria, or approved work procedures. Nonconforming items shall be identified by marking, tagging, or segregating, and the affected generator/storage site(s) notified. Any waste container for which a nonconformance report (**NCR**) has been written will not be shipped to the WIPP facility unless the condition that led to the NCR for that container has been dispositioned in accordance with DOE's Quality Assurance Program Description (**QAPD**). Disposition of nonconforming items shall be identified and documented. The QAPjPs shall identify the person(s) responsible for evaluating and dispositioning nonconforming items and shall include referenced procedures for handling them. For each container selected for confirmation pursuant to Permit Attachment C7, the Permittees will examine the respective NCR documentation to verify NCRs have been dispositioned for the selected container.

Management at all levels shall foster a "no-fault" attitude to encourage the identification of nonconforming items and processes. Nonconformances may be detected and identified by anyone performing WAP activities, including

- Project staff - during field operations, supervision of subcontractors, data validation and verification, and self-assessment

- ~~Laboratory~~ Testing Facility staff - during the preparation for and performance of laboratory testing; calibration of equipment; QC activities; ~~laboratory~~ data review, validation, and verification; and self-assessment

- QA personnel - during oversight activities or audits

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A NCR shall be prepared for each nonconformance identified. Each NCR shall be initiated by the individual(s) identifying the nonconformance. The NCR shall then be processed by knowledgeable and appropriate personnel. For this purpose, a NCR including, or referencing as appropriate, results of ~~laboratory analysis,~~ QC tests, audit reports, internal memoranda, or letters shall be prepared. The NCR must provide the following information:

- Identification of the individual(s) identifying or originating the nonconformance
- Description of the nonconformance
- Method(s) or suggestions for correcting the nonconformance (corrective action)
- Schedule for completing the corrective action
- An indication of the potential ramifications and overall usability of the data, if applicable
- Any approval signatures specified in the site nonconformance procedures

The Permittees shall require the Site Project Manager to oversee the NCR process and be responsible for developing a plan to identify and track all nonconformances and report this information to the Permittees. The Site Project Manager is also responsible for notifying project personnel of the nonconformance and verifying completion of the corrective action for nonconformances.

Nonconformance to DQOs

For any non-administrative nonconformance related to applicable requirements specified in this WAP which are first identified at the Site Project Manager signature release level (i.e., a failure to meet a DQO), the Permittees shall receive written notification within seven calendar days of identification and shall also receive a NCR within 30 calendar days of identification of the incident. DOE shall require the generator/storage site to implement a corrective action which remedies the nonconformance prior to management, storage, or disposal of the waste at WIPP. The Permittees shall send NMED a monthly summary of nonconformances identified during the previous month, indicating the number of nonconformances received and the generator/storage sites responsible.

DOE's Corrective Action Process

DOE shall initiate a corrective action process when internal nonconformances and nonconformances at the generator/storage sites are identified. Activities and processes that do not meet requirements are documented as deficiencies.

When a deficiency is identified by the Permittees, the following process action steps are required:

- The condition is documented on a Corrective Action Report (**CAR**) by the individual identifying the problem.

- DOE has designated the CAR Initiator and Assessment Team Leader to review the CAR, determine validity of the finding (determine that a requirement has been violated), classify the significance of the condition, assign a response due date, and issue the CAR to the responsible party.

- The responsible organization reviews the CAR, evaluates the extent and cause of the deficiency and provides a response to DOE, indicating remedial actions and actions to preclude recurrence that will be taken.

- DOE reviews the response from the responsible organization and, if acceptable, communicates the acceptance to the responsible organization.

- The responsible organization completes remedial actions and actions to preclude recurrence of the condition.

- After all corrective actions have been completed, DOE schedules and performs a verification to ensure that corrective actions have been completed and are effective. When all actions have been completed and verified as being effective, the CAR is closed by the CAR Initiator and Assessment Team Leader on behalf of DOE.

- As part of the planning process for subsequent audits and surveillances, past deficiencies are reviewed and the previous deficient activity or process is subject to reassessment.

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## C3-~~1~~48 Special Training Requirements and Certifications

Before performing activities that affect WAP quality, all personnel are required to receive indoctrination into the applicable scope, purpose, and objectives of the WAP and the specific QAOs of the assigned task. Personnel assigned to perform activities for the WAP shall have the education, experience, and training applicable to the functions associated with the work. Evidence of personnel proficiency and demonstration of competence in the task(s) assigned must be demonstrated and documented. All personnel designated to work on specific aspects of the WAP shall maintain qualification (i.e., training and certification) throughout the duration of the work as specified in this WAP and applicable QAPjPs/procedures. Job performance shall be evaluated and documented at periodic intervals, as specified in the implementing procedures.

Personnel involved in WAP activities shall receive continuing training to ensure that job proficiency is maintained. If not specified by this WAP, the due date for required continuing training courses and requalification shall be the end of the month of the anniversary date when the training was previously completed. Training includes both education in principles and enhancement of skills. Each participating site shall include in its QAPjP a description of the procedures for implementing personnel qualification and training. All training records that

specify the scope of the training, the date of completion, and documentation of job proficiency shall be maintained as QA Records in the site project file.

~~Analytical laboratory line management must ensure that analytical personnel are qualified to perform the analytical method(s) for which they are responsible.~~ The minimum qualifications for certain specified positions for the WAP are summarized in Table C3-~~10~~2. QAPjPs, or their implementing SOPs, shall specify the site-specific titles and minimum training and qualification requirements for personnel performing WAP activities. QAPjPs/procedures shall also contain the requirements for maintaining records of the qualification, training, and demonstrations of proficiency by these personnel.

An evaluation of personnel qualifications shall include comparing and evaluating the requirements specified in the job/position description and the skills, training, and experience included in the current resume of the person. This evaluation also must be performed for personnel who change positions because of a transfer or promotion as well as personnel assigned to short-term or temporary work assignments that may affect the quality of the WAP. QAPjPs/procedures shall identify the responsible person(s) for ensuring that all personnel maintain proficiency in the work performed and identify any additional training that may be required.

## C3-~~15~~9 Changes to WAP-Related Plans or Procedures

Controlled changes to WAP-related plans or procedures shall be managed through the document control process described in the QAPD. The Site Project Manager shall review all non-administrative changes and evaluate whether those changes could impact DQOs specified in the Permit. After site certification, any changes to WAP-related plans or procedures that could positively or negatively impact DQOs (i.e., those changes that require prior approval of DOE as defined in Attachment C5, Section C5-2) shall be reported to DOE within five days of identification by the project level review. The Permittees shall send NMED a monthly summary briefly describing the changes to plans and procedures identified pursuant to this section during the previous month.

## C3-~~16~~10 List of References

DOE, 2009. Waste Data System User's Manual. DOE/WIPP 09-3427, Current Revision, Carlsbad, New Mexico, Carlsbad Area Office, U.S. Department of Energy.

~~DOE. 2003. Performance Demonstration Program Plan for the Analysis of Simulated Headspace Gases. DOE/CAO-95-1076, Current Revision, Carlsbad, New Mexico, Carlsbad Area Office, U.S. Department of Energy.~~

~~DOE. 2005. Performance Demonstration Program Plan for RCRA Constituent Analysis of Solidified Wastes. DOE/CBFO-95-1077, Current Revision, Carlsbad, New Mexico, Carlsbad Area Office, U.S. Department of Energy.~~

~~EPA. 1996. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. SW-846, Fourth Edition, Washington, D.C., Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency.~~

~~Fisenne, I. M., et al. 1973. "Least Squares Analysis and Minimum Detection Levels Applied to Multi-Component Alpha Emitting Samples." *Radiochem. Radioanal. Letters,* 16, No. 1: pp. 5-16.~~

Pasternack B. S. and N. H. Harley. 1971. "Detection Limits for Radionuclides in the Analysis of Multi-Component Gamma-Spectrometric Data." *Nucl. Instr. and Meth,* No. 91: pp. 533-40.

# TABLES

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**Table C3-1**
**Waste Material Parameters and Descriptions**

| Waste Material Parameter | Description |
|---|---|
| Iron-based Metals/Alloys | Iron and steel alloys in the waste; does not include the waste container materials |
| Aluminum-based Metals/Alloys | Aluminum or aluminum-based alloys in the waste materials |
| Other Metals | All other metals found in the waste materials |
| Other Inorganic Materials | Nonmetallic inorganic waste including concrete, glass, firebrick, ceramics, sand, and inorganic sorbents |
| Cellulosics | Materials generally derived from high-polymer plant carbohydrates; (e.g., paper, cardboard, wood, and cloth) |
| Rubber | Natural or man-made elastic latex materials; (e.g., surgeons' gloves, and leaded rubber gloves) |
| Plastics (waste materials) | Generally man-made materials, often derived from petroleum feedstock; (e.g., polyethylene and polyvinylchloride) |
| Organic Matrix | Cemented organic resins, solidified organic liquids and sludges |
| Inorganic Matrix | Any homogeneous materials consisting of sludge or aqueous-based liquids that are solidified with cement, calcium silicate, or other solidification agents; (e.g., wastewater treatment sludge, cemented aqueous liquids, and inorganic particulates) |
| Soils/gravel | Generally consists of naturally occurring soils that have been contaminated with inorganic waste materials |
| Steel (packaging materials) | 55-gal (208-L) drums |
| Plastics (packaging materials) | 90-mil polyethylene drum liner and plastic bags |

~~Table C3-2~~
~~Gas Volatile Organic Compounds Target Analyte List and Quality Assurance Objectives~~

| ~~Compound~~ | ~~CAS Number~~ | ~~Precision[a] (%RSD or RPD)~~ | ~~Accuracy[a] (%R)~~ | ~~MDL[b,d] (ng)~~ | ~~FTIRS MDL[b] (ppmv)~~ | ~~PRQL (ppmv)~~ | ~~Completeness (%)~~ |
|---|---|---|---|---|---|---|---|
| ~~Benzene~~ | ~~71-43-2~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~Bromoform~~ | ~~75-25-2~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~Carbon tetrachloride~~ | ~~56-23-5~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~Chlorobenzene~~ | ~~108-90-7~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~Chloroform~~ | ~~67-66-3~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~1,1-Dichloroethane~~ | ~~75-34-3~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~1,2-Dichloroethane~~ | ~~107-06-2~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~1,1-Dichloroethylene~~ | ~~75-35-4~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~trans-1,2-Dichloroethylene~~ | ~~156-60-5~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~Ethyl benzene[d]~~ | ~~100-41-4~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~10~~ | ~~10~~ | ~~90~~ |
| ~~Ethyl ether~~ | ~~60-29-7~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~Methylene chloride~~ | ~~75-09-2~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~1,1,2,2-Tetrachloroethane~~ | ~~79-34-5~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~Tetrachloroethylene~~ | ~~127-18-4~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~Toluene~~ | ~~108-88-3~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~1,1,1-Trichloroethane~~ | ~~71-55-6~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~Trichloroethylene~~ | ~~79-01-6~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~1,1,2-Trichloro-1,2,2-trifluoroethane~~ | ~~76-13-1~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~m-Xylene[c]~~ | ~~108-38-3~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| ~~o-Xylene~~ | ~~95-47-6~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |
| | ~~106-42-3~~ | ~~≤25~~ | ~~70-130~~ | ~~10~~ | ~~5~~ | ~~10~~ | ~~90~~ |

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|---|---|---|---|---|---|---|---|
| ~~p-Xylene [c]~~ | ~~67-64-1~~ | ~~≤25~~ | ~~70-130~~ | ~~150~~ | ~~50~~ | ~~100~~ | ~~90~~ |
| ~~Acetone~~ | ~~71-36-3~~ | ~~≤25~~ | ~~70-130~~ | ~~150~~ | ~~50~~ | ~~100~~ | ~~90~~ |
| ~~Butanol~~ | ~~67-56-1~~ | ~~≤25~~ | ~~70-130~~ | ~~150~~ | ~~50~~ | ~~100~~ | ~~90~~ |
| ~~Methanol~~ | ~~78-93-3~~ | ~~≤25~~ | ~~70-130~~ | ~~150~~ | ~~50~~ | ~~100~~ | ~~90~~ |
| ~~Methyl ethyl ketone~~ | ~~108-10-1~~ | ~~≤25~~ | ~~70-130~~ | ~~150~~ | ~~50~~ | ~~100~~ | ~~90~~ |
| ~~Methyl isobutyl ketone~~ | | | | | | | |

~~[a] Criteria apply to PRQL concentrations.~~

~~[b] Values based on delivering 10 mL to the analytical system.~~

~~[c] These xylene isomers cannot be resolved by GC/MS.~~

~~[d] The ethyl benzene PRQL for FTIRS is 20 ppm~~

~~CAS = Chemical Abstract Service~~

~~%RSD = Percent relative standard deviation~~

~~RPD = Relative percent difference~~

~~%R = Percent recovery~~

~~MDL = Method detection limit (maximum permissible value), for GC/MS and GC/FID; total number of nanograms delivered to the analytical system per sample (nanograms); for FTIRS based on 1 m sample cell~~

~~PRQL = Program required quantitation limit (parts per million/volume basis)~~

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~~Table C3-3~~
~~Summary of Laboratory Quality Control Samples and Frequencies for Gas Volatile Organic Compound Analysis~~

| ~~QC Sample~~ | ~~Minimum Frequency~~ | ~~Acceptance Criteria~~ | ~~Corrective Action~~ [a] |
|---|---|---|---|
| ~~Method performance samples~~ | ~~Seven (7) samples initially and four (4) semiannually~~ | ~~Meet method QAOs~~ | ~~Repeat until acceptable~~ |
| ~~Laboratory duplicates or on-line duplicates~~ | ~~One (1) per analytical batch or on-line batch~~ | ~~RPD ≤ 25~~[b] | ~~Nonconformance if RPD >25~~ |
| ~~Laboratory blanks or on-line blanks~~ | ~~Daily prior to sample analysis for GC/MS and GC/FID. Otherwise, daily prior to sample analysis and one (1) per analytical batch or on-line~~ | ~~Analyte amounts ≤ 3 × MDLs for GC/MS and GC/FID; ≤ PRQL for FTIRS~~ | ~~Flag Data if analyte amounts > 3 × MDLs for GC/MS and GC/FID; > PRQL for FTIRS~~ |
| ~~Laboratory control samples or on-line control samples~~ | ~~One (1) per analytical batch or on-line batch~~ | ~~70-130 %R~~ | ~~Nonconformance if %R <70 or >130~~ |
| ~~GC/MS comparison sample (for FTIRS only)~~ | ~~One (1) per analytical or on-line batch~~ | ~~RPD ≤ 25~~[b] | ~~Nonconformance if RPD > 25~~ |
| ~~Blind audit samples~~ | ~~Samples and frequency controlled by the Gas PDP Plan~~ | ~~Specified in the Gas PDP Plan~~ | ~~Specified in the Gas PDP Plan~~ |
| ~~GC/MS~~ | ~~BFB Tune Every 12 hours~~ | ~~Abundance criteria for key ions are met~~ | ~~Repeat Until Acceptable~~ |
| ~~GC/MS~~ | ~~Minimum 5-point initial calibration (minimum of 5 standards) Initially and as needed~~ | ~~%RSD of response factor for each target analyte <35~~ | ~~Repeat Until Acceptable~~ |
| ~~GC/MS~~ | ~~Continuing calibration Every 12 hours~~ | ~~%D for all target analytes ≤ 30 of initial calibration~~ | ~~Repeat Until Acceptable~~ |
| ~~GC/FID~~ | ~~Minimum 3-point initial calibration (minimum 3 standards) Initially and as needed~~ | ~~Correlation coefficient ≥ 0.99 or %RSD <20 for each target analyte and the retention time of each target analyte within an acceptance~~ | ~~Repeat Until Acceptable~~ |

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| | | ~~criteria defined in the method~~ | |
| ~~GC/FID~~ | ~~Continuing calibration Every 12 hours~~ | ~~%RSD ≤ 15%~~ | ~~Repeat Until Acceptable~~ |

~~[a] Corrective action per Section C3-13 when final reported QC samples do not meet the acceptance criteria.~~

~~[b] Applies only to concentrations greater than the PRQLs listed in Table C3-2.~~

~~MDL = Method Detection Limit~~

~~QAO = Quality Assurance Objective~~

~~PDP = Performance Demonstration Program~~

~~PRQL = Program Required Quantitation Limit~~

~~%R = Percent Recovery~~

~~RPD = Relative Percent Difference~~

~~BFB = 4-Bromofluorobenzene~~

~~%D = Percent difference~~

~~%RSD = Percent relative standard deviation~~

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~~Table C3-4~~
~~Volatile Organic Compounds Target Analyte List and Quality Assurance Objectives~~

| ~~Compound~~ | ~~CAS Number~~ | ~~Precision [a] (%RSD or RPD)~~ | ~~Accuracy [a] (%R)~~ | ~~MDL [b] (mg/kg)~~ | ~~PRQL [b] (mg/kg)~~ | ~~Completeness (%)~~ |
|---|---|---|---|---|---|---|
| ~~Benzene~~ | ~~71-43-2~~ | ~~≤45~~ | ~~37-151~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Bromoform~~ | ~~75-25-2~~ | ~~≤47~~ | ~~45-169~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Carbon disulfide~~ | ~~75-15-0~~ | ~~≤50~~ | ~~60-150~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Carbon tetrachloride~~ | ~~56-23-5~~ | ~~≤30~~ | ~~70-140~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Chlorobenzene~~ | ~~108-90-7~~ | ~~≤38~~ | ~~37-160~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Chloroform~~ | ~~67-66-3~~ | ~~≤44~~ | ~~51-138~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~1,4-Dichlorobenzene [c]~~ | ~~106-46-7~~ | ~~≤60~~ | ~~18-190~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~ortho-Dichlorobenzene [c]~~ | ~~95-50-1~~ | ~~≤60~~ | ~~18-190~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~1,2-Dichloroethane~~ | ~~107-06-2~~ | ~~≤42~~ | ~~49-155~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~1,1-Dichloroethylene~~ | ~~75-35-4~~ | ~~≤250~~ | ~~D-234 [d]~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~trans-1,2-Dichloroethylene~~ | ~~156-60-5~~ | ~~≤50~~ | ~~60-150~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Ethyl benzene~~ | ~~100-41-4~~ | ~~≤43~~ | ~~37-162~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Methylene chloride~~ | ~~75-09-2~~ | ~~≤50~~ | ~~D-221 [d]~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~1,1,2,2-Tetrachloroethane~~ | ~~79-34-5~~ | ~~≤55~~ | ~~46-157~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Tetrachloroethylene~~ | ~~127-18-4~~ | ~~≤29~~ | ~~64-148~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Toluene~~ | ~~108-88-3~~ | ~~≤29~~ | ~~47-150~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~1,1,1-Trichloroethane~~ | ~~71-55-6~~ | ~~≤33~~ | ~~52-162~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~1,1,2-Trichloroethane~~ | ~~79-00-5~~ | ~~≤38~~ | ~~52-150~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Trichloroethylene~~ | ~~79-01-6~~ | ~~≤36~~ | ~~71-157~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~Trichlorofluoromethane~~ | ~~75-69-4~~ | ~~≤110~~ | ~~17-181~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~1,1,2-Trichloro-1,2,2-trifluoroethane~~ | ~~76-13-1~~ | ~~≤50~~ | ~~60-150~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| | ~~75-01-4~~ | ~~≤200~~ | ~~D-251 [d]~~ | ~~1~~ | ~~4~~ | ~~90~~ |

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|---|---|---|---|---|---|---|
| ~~Vinyl chloride~~ | ~~108-38-3~~ | ~~≤50~~ | ~~60-150~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~m-xylene~~ | ~~95-47-6~~ | ~~≤50~~ | ~~60-150~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~o-xylene~~ | ~~106-42-3~~ | ~~≤50~~ | ~~60-150~~ | ~~1~~ | ~~10~~ | ~~90~~ |
| ~~p-xylene~~ | ~~67-64-1~~ | ~~≤50~~ | ~~60-150~~ | ~~10[e]~~ | ~~100~~ | ~~90~~ |
| ~~Acetone~~ | ~~71-36-3~~ | ~~≤50~~ | ~~60-150~~ | ~~10[e]~~ | ~~100~~ | ~~90~~ |
| ~~Butanol~~ | ~~60-29-7~~ | ~~≤50~~ | ~~60-150~~ | ~~10[e]~~ | ~~100~~ | ~~90~~ |
| ~~Ethyl ether~~ | ~~50-00-0~~ | ~~≤50~~ | ~~60-150~~ | ~~10[e]~~ | ~~100~~ | ~~90~~ |
| ~~Formaldehyde [f]~~ | ~~302-01-2~~ | ~~≤50~~ | ~~60-150~~ | ~~10[e]~~ | ~~100~~ | ~~90~~ |
| ~~Hydrazine [g]~~ | ~~78-83-1~~ | ~~≤50~~ | ~~60-150~~ | ~~10[e]~~ | ~~100~~ | ~~90~~ |
| ~~Isobutanol~~ | ~~67-56-1~~ | ~~≤50~~ | ~~60-150~~ | ~~10[e]~~ | ~~100~~ | ~~90~~ |
| ~~Methanol~~ | ~~78-93-3~~ | ~~≤50~~ | ~~60-150~~ | ~~10[e]~~ | ~~100~~ | ~~90~~ |
| ~~Methyl ethyl ketone~~ | ~~110-86-1~~ | ~~≤50~~ | ~~60-150~~ | ~~10[e]~~ | ~~100~~ | ~~90~~ |
| ~~Pyridine [c]~~ | | | | | | |

~~[a] Applies to laboratory control samples and laboratory matrix spikes. If a solid laboratory control sample material which has established statistical control limits is used, then the established control limits for that material should be used for accuracy requirements.~~

~~[b] TCLP MDL and PRQL values are reported in units of mg/l and limits are reduced by a factor of 20.~~

~~[c] Can also be analyzed as a semi-volatile organic compound. If analyzed as a semi-volatile compound, the QAOs of Table C3-6 apply.~~

~~[d] Detected; result must be greater than zero.~~

~~[e] Estimate, to be determined.~~

~~[f] Required only for homogeneous solids and soil/gravel waste from Savannah River Site, if analysis is required to resolve assignment of EPA hazardous waste numbers.~~

~~[g] Required only for homogeneous solids and soil/gravel waste from Oak Ridge National Laboratory and Savannah River Site, if analysis is required to resolve assignment of EPA hazardous waste numbers.~~

~~CAS = Chemical Abstract Service~~

~~%RSD = Percent relative standard deviation~~

~~RPD = Relative percent difference~~

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~~**%R = Percent recovery**~~

~~**MD = Method detection limit (maximum permissible value) (milligrams per kilogram)**~~

~~**PRQL = Program required quantitation limit; calculated from the toxicity characteristic level for benzene assuming a 0.9 oz (25-gram [g]) sample, 0.1 gal (0.5 liter [L]) of extraction fluid, and 100 percent analyte extraction (milligrams per kilogram)**~~

~~Table C3-5~~
~~Summary of Laboratory Quality Control Samples and Frequencies for Volatile Organic Compound Analysis~~

| ~~QC Sample~~ | ~~Minimum Frequency~~ | ~~Acceptance Criteria~~ | ~~Corrective Action~~ [a] |
|---|---|---|---|
| ~~Method performance samples~~ | ~~Seven (7) samples initially and four (4) semiannually~~ | ~~Meet Table C3-4 QAOs~~ | ~~Repeat until acceptable~~ |
| ~~Laboratory duplicates~~ [b] | ~~One (1) per analytical batch~~ | ~~Meet Table C3-4 precision QAOs~~ | ~~Nonconformance if RPDs > values in Table C3-4~~ |
| ~~Laboratory blanks~~ | ~~One (1) per analytical batch~~ | ~~Analyte concentrations ≤ 3 × MDLs~~ | ~~Nonconformance if analyte concentrations > 3 × MDLs~~ |
| ~~Matrix spikes~~ [b] | ~~One (1) per analytical batch~~ | ~~Meet Table C3-4 accuracy QAOs~~ | ~~Nonconformance if %Rs are outside the range specified in Table C3-4~~ |
| ~~Matrix spike duplicates~~ | ~~One (1) per analytical batch~~ | ~~Meet Table C3-4 accuracy and precision QAOs~~ | ~~Nonconformance if RPDs > values and %Rs outside range specified in Table C3-4~~ |
| ~~Laboratory control samples~~ | ~~One (1) per analytical batch~~ | ~~Meet Table C3-4 accuracy QAOs~~ | ~~Nonconformance if %R < 80 or > 120~~ |
| ~~GC/MS Calibration~~ | ~~BFB Tune every 12 hours~~<br><br>~~5-pt. Initial Calibration initially, and as needed~~ | ~~Abundance criteria met as per method~~<br><br>~~Calibrate according to SW-846 Method requirements:~~<br><br>~~%RSD for CCC ≤ 30, %RSD for all other compounds ≤ 15%~~<br><br>~~Average response factor (RRF) used if %RSD ≤ 15, use linear regression if %RSD >15; R or $R^2$ ≥ 0.990 if using alternative curve~~<br><br>~~System Performance Check Compound~~ | ~~Repeat until acceptable~~ |

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| ~~QC Sample~~ | ~~Minimum Frequency~~ | ~~Acceptance Criteria~~ | ~~Corrective Action~~ [a] |
|---|---|---|---|
| | | ~~(SPCC) minimum RRF as per SW-846 Method; RRF for all other compounds ≥ 0.01~~ | |
| ~~GC/MS Calibration (continued)~~ | ~~Continuing Calibration every 12 hours~~ | ~~%D ≤ 20 for CCC;~~<br><br>~~SPCC minimum RRF as per SW-846 Method; RRF for all other compounds ≥ 0.01~~<br><br>~~RT for internal standard must be ± 30 seconds from last daily calibration, internal standard area count must be >50% and <200% of last daily calibration~~ | ~~Repeat until acceptable~~ |
| ~~GC/FID Calibration~~ | ~~3-pt. Initial Calibration initially and as needed~~<br><br>~~Continuing Calibration every 12 hours~~ | ~~Correlation Coefficient ≥ 0.990 or %RSD ≤ 20 for all analytes~~<br><br>~~%D or %Drift for all analytes ≤ 15 of expected values,~~<br><br>~~RT ± 3 standard deviations from initial RT calibration per applicable SW-846 Method~~ | ~~Repeat until acceptable.~~ |
| ~~Surrogate compounds~~ | ~~Each analytical sample~~ | ~~Average %R from minimum of 30 samples for a given matrix ±3 standard deviations~~ | ~~Nonconformance if %R < (average %R - 3 standard deviation) or > (average %R + 3 standard deviation)~~ |
| ~~Blind audit samples~~ | ~~Samples and frequency controlled by the Solid PDP Plan~~ | ~~Specified in the Solid PDP Plan~~ | ~~Specified in the Solid PDP Plan~~ |

~~[a] Corrective Action per Section C3-13 when final reported QC samples do not meet the acceptance criteria. Nonconformances do not apply to matrix related exceedances.~~

~~[b] May be satisfied using matrix spike duplicate; acceptance criteria applies only to~~

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| ~~QC Sample~~ | ~~Minimum Frequency~~ | ~~Acceptance Criteria~~ | ~~Corrective Action~~ [a] |
|---|---|---|---|

~~concentrations greater than the PRQLs listed in Table C3-4.~~

~~MDL = Method detection limit~~

~~QAO = Quality assurance objective~~

~~PDP = Performance Demonstration Program~~

~~%R = Percent recovery~~

~~RPD = Relative percent difference~~

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~~Table C3-6~~
~~Semi-Volatile Organic Compound Target Analyte List and Quality Assurance Objectives~~

| ~~Compound~~ | ~~CAS Number~~ | ~~Precision [a] (%RSD or RPD)~~ | ~~Accuracy [a] (%R)~~ | ~~MDL [b] (mg/kg)~~ | ~~PRQL [b] (mg/kg)~~ | ~~Completeness (%)~~ |
|---|---|---|---|---|---|---|
| ~~Cresols~~ | ~~1319-77-3~~ | ~~≤50~~ | ~~25-115~~ | ~~5~~ | ~~40~~ | ~~90~~ |
| ~~1,4-Dichlorobenzene [bc]~~ | ~~106-46-7~~ | ~~≤86~~ | ~~20-124~~ | ~~5~~ | ~~40~~ | ~~90~~ |
| ~~ortho-Dichlorobenzene [c]~~ | ~~95-50-1~~ | ~~≤64~~ | ~~32-129~~ | ~~5~~ | ~~40~~ | ~~90~~ |
| | ~~51-28-5~~ | ~~≤119~~ | ~~D-172[d]~~ | ~~5~~ | ~~40~~ | ~~90~~ |
| ~~2,4-Dinitrophenol~~ | ~~121-14-2~~ | ~~≤46~~ | ~~39-139~~ | ~~0.3~~ | ~~2.6~~ | ~~90~~ |
| ~~2,4-Dinitrotoluene~~ | ~~118-74-1~~ | ~~≤319~~ | ~~D-152[d]~~ | ~~0.3~~ | ~~2.6~~ | ~~90~~ |
| ~~Hexachlorobenzene~~ | ~~67-72-1~~ | ~~≤44~~ | ~~40-113~~ | ~~5~~ | ~~40~~ | ~~90~~ |
| ~~Hexachloroethane~~ | ~~98-95-3~~ | ~~≤72~~ | ~~35-180~~ | ~~5~~ | ~~40~~ | ~~90~~ |
| ~~Nitrobenzene~~ | ~~87-86-5~~ | ~~≤128~~ | ~~14-176~~ | ~~5~~ | ~~40~~ | ~~90~~ |
| ~~Pentachlorophenol~~ | ~~110-86-1~~ | ~~≤50~~ | ~~25-115~~ | ~~5~~ | ~~40~~ | ~~90~~ |
| ~~Pyridine [c]~~ | | | | | | |

~~CAS = Chemical Abstract Service~~

~~%RSD = Percent relative standard deviation~~

~~RPD = Relative percent difference~~

~~%R = Percent recovery~~

~~MDL = Method detection limit (maximum permissible value) (milligrams per kilogram)~~

~~PRQL = Program required quantitation limit; calculated from the toxicity characteristic level for nitrobenzene assuming a 100-gram (g) sample, 0.5 gal (2 liter [L]) of extraction fluid, and 100 percent analyte extraction (milligrams per kilograms)~~

~~[a] Applies to laboratory control samples and laboratory matrix spikes. If a solid laboratory control sample material which has established statistical control limits is used, then the established control limits for that material should be used for accuracy requirements.~~

~~[b] TCLP MDL and PRQL values are reported in units of mg/l and limits are reduced by a factor of 20.~~

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[e] ~~Can also be analyzed as a volatile organic compound~~

[d] ~~Detected; result must be greater than zero~~

~~**Table C3-7**~~
~~**Summary of Laboratory Quality Control Samples and Frequencies for Semi-Volatile Organic Compounds Analysis**~~

| ~~QC Sample~~ | ~~Minimum Frequency~~ | ~~Acceptance Criteria~~ | ~~Corrective Action [a]~~ |
|---|---|---|---|
| ~~Method performance samples~~ | ~~Seven (7) samples initially and four (4) semiannually~~ | ~~Meet Table C3-6 QAOs~~ | ~~Repeat until acceptable~~ |
| ~~Laboratory duplicates [b]~~ | ~~One (1) per analytical batch~~ | ~~Meet Table C3-6 precision QAOs~~ | ~~Nonconformance if RPDs > values in Table C3-6~~ |
| ~~Laboratory blanks~~ | ~~One (1) per analytical batch~~ | ~~Analyte concentrations ≤ 3 × MDLs~~ | ~~Nonconformance if analyte concentrations > 3 × MDLs~~ |
| ~~Matrix spikes~~ | ~~One (1) per analytical batch~~ | ~~Meet Table C3-6 accuracy QAOs~~ | ~~Nonconformance if RPDs > values and %Rs outside range in Table C3-6~~ |

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| ~~QC Sample~~ | ~~Minimum Frequency~~ | ~~Acceptance Criteria~~ | ~~Corrective Action [a]~~ |
|---|---|---|---|
| ~~GC/MS Calibration~~ | ~~DFTPP Tune every 12 hours~~<br><br>~~5-pt. Initial Calibration initially, and as needed~~<br><br>~~Continuing Calibration every 12 hours~~ | ~~Abundance criteria met as per method~~<br><br>~~Calibrate according to SW-846 Method requirements:~~<br><br>~~%RSD for CCC ≤ 30, %RSD for all other compounds ≤ 15% Average response factor (RRF) used if %RSD ≤ 15, use linear regression if >15; R or $R^2$ ≥0.990 if using alternative curve~~<br><br>~~System Performance Check Compound (SPCC) minimum RRF as per SW-846 Method; RRF for all other compounds ≥ 0.01~~<br><br>~~%D≤ 20 for CCC,~~<br><br>~~SPCC minimum RRF as per SW-846 Method; RRF for all other compounds ≥ 0.01~~<br><br>~~RT for internal standard must be ± 30 seconds from last daily calibration, internal standard area count must be >50% and <200% of last daily calibration~~ | ~~Repeat until acceptable~~ |

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| ~~QC Sample~~ | ~~Minimum Frequency~~ | ~~Acceptance Criteria~~ | ~~Corrective Action~~ [a] |
|---|---|---|---|
| ~~GC/ECD Calibration~~ | ~~5-pt. Calibration initially and as needed~~<br><br>~~Continuing Calibration every 12 hours~~ | ~~Correlation Coefficient ≥ 0.990 or %RSD < 20 for all analytes~~<br><br>~~%D or %Drift for all analytes ≤ 15 of expected values,~~<br><br>~~RT ± 3 standard deviations of initial RT calibration per applicable SW-846 Method~~ | ~~Repeat until acceptable~~ |
| ~~Matrix spike duplicates~~ | ~~One (1) per analytical batch~~ | ~~Meet Table C3-6 accuracy and precision QAOs~~ | ~~Nonconformance if RPDs > values and %Rs outside range specified in Table C3-6~~ |
| ~~Laboratory control samples~~ | ~~One (1) per analytical batch~~ | ~~Meet Table C3-6 accuracy QAOs~~ | ~~Nonconformance if %R < 80 or > 120~~ |
| ~~Surrogate compounds~~ | ~~Each analytical sample~~ | ~~Average %R from minimum of 30 samples from a given matrix ±3 standard deviations~~ | ~~Nonconformance if %R < (average %R - 3 standard deviations) or > (average %R + 3 standard deviations)~~ |
| ~~Blind audit samples~~ | ~~Samples and frequency controlled by the Solid PDP Plan~~ | ~~Specified in the Solid PDP Plan~~ | ~~Specified in the Solid PDP Plan~~ |

~~[a] Corrective action per Section C3-13 when final reported QC samples do not meet the acceptance criteria. Nonconformances do not apply to matrix related exceedances.~~

~~[b] May be satisfied by using matrix spike duplicate; acceptance criteria applies only to concentrations greater than the PRQLs listed in Table C3-6.~~

~~MDL = Method Detection Limit~~

~~QAO = Quality Assurance Objective~~

~~PDP = Performance Demonstration Program~~

~~%R = Percent Recovery~~

~~RPD = Relative Percent Difference~~

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~~**Table C3-8**~~
~~**Metals Target Analyte List and Quality Assurance Objectives**~~

| ~~Analyte~~ | ~~CAS Number~~ | ~~Precision (%RSD or RPD)[a]~~ | ~~Accuracy (%R)[b]~~ | ~~PRDL[d] (µg/L)~~ | ~~PRQL[c] (mg/kg)~~ | ~~Completeness (%)~~ |
|---|---|---|---|---|---|---|
| ~~Antimony~~ | ~~7440-36-0~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |
| ~~Arsenic~~ | ~~7440-38-2~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |
| ~~Barium~~ | ~~7440-39-3~~ | ~~≤30~~ | ~~80-120~~ | ~~2000~~ | ~~2000~~ | ~~90~~ |
| ~~Beryllium~~ | ~~7440-41-7~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |
| ~~Cadmium~~ | ~~7440-43-9~~ | ~~≤30~~ | ~~80-120~~ | ~~20~~ | ~~20~~ | ~~90~~ |
| ~~Chromium~~ | ~~7440-47-3~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |
| ~~Lead~~ | ~~7439-92-1~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |
| ~~Mercury~~ | ~~7439-97-6~~ | ~~≤30~~ | ~~80-120~~ | ~~4.0~~ | ~~4.0~~ | ~~90~~ |
| ~~Nickel~~ | ~~7440-02-0~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |
| ~~Selenium~~ | ~~7782-49-2~~ | ~~≤30~~ | ~~80-120~~ | ~~20~~ | ~~20~~ | ~~90~~ |
| ~~Silver~~ | ~~7440-22-4~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |
| ~~Thallium~~ | ~~7440-28-0~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |
| ~~Vanadium~~ | ~~7440-62-2~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |
| ~~Zinc~~ | ~~7440-66-6~~ | ~~≤30~~ | ~~80-120~~ | ~~100~~ | ~~100~~ | ~~90~~ |

~~[a] ≤ 30 percent control limits apply when sample and duplicate concentrations are ≥ 10 × IDL for ICP-AES and AA techniques, and ≥ 100 × IDL for Inductively Coupled Plasma—Mass Spectrometry (ICP-MS) techniques. If less than these limits, the absolute difference between the two values shall be less than or equal to the PRQL.~~

~~[b] Applies to laboratory control samples and laboratory matrix spikes. If a solid laboratory control sample material which has established statistical control limits is used, then the established control limits for that material should be used for accuracy requirements.~~

~~[c] TCLP PRQL values are reported in units of mg/l and limits are reduced by a factor of 20.~~

~~[d] PRDL set such that it is a factor of 10 below the PRQL for 100 percent solid samples, assuming a 100× dilution during digestion.~~

~~CAS = Chemical Abstract Service~~

~~%RSD = Percent relative standard deviation~~

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~~**RPD = Relative percent difference**~~

~~**%R = Percent recovery**~~

~~**PRDL = Program required detection limit (i.e., maximum permissible value for IDL) (micrograms per liter)**~~

~~**PRQL = Program required quantitation limit (milligrams per kilogram)**~~

~~Table C3-9~~
~~Summary of Laboratory Quality Control Samples and Frequencies for Metals Analysis~~

| ~~QC Sample~~ | ~~Minimum Frequency~~ | ~~Acceptance Criteria~~ | ~~Corrective Action~~ [a] |
|---|---|---|---|
| ~~Method performance samples~~ | ~~Seven (7) samples initially and four (4) semiannually~~ | ~~Meet Table C3-8 QAOs~~ | ~~Repeat until acceptable~~ |
| ~~Laboratory blanks~~ | ~~One (1) per analytical batch~~ | ~~≤ 3 × IDL (≤ 5 × IDL for ICP-MS)~~ [b] | ~~Redigest and reanalyze any samples with analyte concentrations which are ≤10 × blank value and ≥ 0.5 × PRQL~~ |
| ~~Matrix spikes~~ | ~~One (1) per analytical batch~~ | ~~Meet Table C3-8 accuracy QAOs~~ | ~~Nonconformance if %R outside the range specified in Table C3-8~~ |
| ~~Matrix spike duplicates~~ | ~~One (1) per analytical batch~~ | ~~Meet Table C3-8 accuracy and precision QAOs~~ | ~~Nonconformance if RPDs > values and %Rs outside range specified in Table C3-8~~ |
| ~~ICP-MS Tune (ICP-MS Only)~~ | ~~Daily~~ | ~~4 Replicate %RSD ≤ 5; mass calibration within 0.9 amu; resolution < 1.0 amu full width at 10% peak height~~ | ~~Nonconformance if %RSD > 5; mass calibration > 0.9 amu; resolution > 1.0 amu~~ |
| ~~Initial Calibration 1 blank, 1 standard (ICP, ICP-MS)~~<br><br>~~3 standard, 1 blank (GFAA, FLAA)~~<br><br>~~5 standard, 1 blank (CVAA, HAA)~~ | ~~Daily~~ | ~~90-110 %R (80-120% for CVAA, GFAA, HAA, FLAA) for initial calibration verification solution.~~<br><br>~~Regression coefficient ≥ 0.995 for FLAA, CVAA, GFAA, MAA~~ | ~~Correct problem and recalibrate; repeat initial calibration~~ |
| ~~Continuing Calibration~~ | ~~Every 10 samples and beginning and end of run~~ | ~~90-110% for continuing calibration verification solution.~~<br><br>~~(80-120% for CVAA, GFAA, HAA, FLAA)~~ | ~~Correct problem and recalibrate; rerun last 10 samples~~ |

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| ~~QC Sample~~ | ~~Minimum Frequency~~ | ~~Acceptance Criteria~~ | ~~Corrective Action [a]~~ |
|---|---|---|---|
| ~~Internal Standard Area Verification (ICP-MS)~~ | ~~Every Sample~~ | ~~Meet SW-846 Method 6020 criteria~~ | ~~Nonconformance if not reanalyzed at 5 × dilution until criteria are met~~ |
| ~~Serial Dilution (ICP, ICP-MS)~~ | ~~One (1) per analytical batch~~ | ~~5 × dilution must be ≤10% D of initial value for sample > 50×IDL~~ | ~~Flag Data if >10% and > 50×IDL~~ |
| ~~Interference Correction Verification (ICP, ICP-MS)~~ | ~~Beginning and end of run or every 12 hours (8 for ICP) whichever is more frequent~~ | ~~80-120% recovery for analytes~~<br><br>~~Note: Acceptance Criteria and Corrective Action apply only if interferents found in samples at levels greater than ICS-A Solution~~ | ~~Correct problem and recalibrate, nonconformance if not corrected~~ |
| ~~Laboratory Control Samples~~ | ~~One (1) per analytical batch~~ | ~~Table C3-8 accuracy QAOs~~ | ~~Redigest and reanalyze for affected analytes; non conformance if not reanalyzed~~ |
| ~~Blind audit samples~~ | ~~Samples and frequency controlled by the Solid PDP Plan~~ | ~~Specified in the Solid PDP Plan~~ | ~~Specified in the Solid PDP Plan~~ |

~~[a] Corrective action per Section C3-13 when final reported QC samples do not meet the acceptance criteria. Nonconformances do not apply to matrix related exceedances.~~

~~[b] Applies only to concentrations greater than the PRQLs listed in Table C3-8.~~

~~IDL = Instrument Detection Limit~~

~~PDP = Performance Demonstration Program~~

~~PRQL = Program Required Quantitation Limit~~

~~%R = Percent Recovery~~

~~RPD = Relative Percent Difference~~

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**Table C3-~~10~~2**
**Minimum Training and Qualifications Requirements ~~a~~**

| Personnel | Requirements ~~a~~ |
|---|---|
| Radiography Operators ~~c~~a | Site-specific training based on waste matrix codes and waste material parameters; requalification every 2 years |
| ~~FTIRS Technical Supervisors b~~<br>~~FTIRS Operators c~~ | ~~Site-specific and on-the-job training based on the site-specific FTIRS system; requalification every 2 years~~ |
| ~~Gas Chromatography Technical Supervisors b~~<br>~~Gas Chromatography Operators c~~ | ~~B.S. or equivalent experience and 6 months previous applicable experience~~ |
| ~~Gas Chromatography/Mass Spectrometry Operators c~~<br>~~Mass Spectrometry Operators c~~ | ~~B.S. or equivalent experience and 1 year independent spectral interpretation or demonstrated expertise~~ |
| ~~Gas Chromatography/Mass Spectrometry Technical Supervisors b~~<br>~~Mass Spectrometry Technical Supervisors b~~<br>~~Atomic Absorption Spectroscopy Technical Supervisors b~~<br>~~Atomic Absorption Spectroscopy Operators c~~<br>~~Atomic Mass Spectrometry Operators c~~<br>~~Atomic Emission Spectroscopy Operators c~~ | ~~B.S. or equivalent experience and 1 year applicable experience~~ |
| ~~Atomic Mass Spectrometry Technical Supervisors b~~ | ~~B.S. and specialized training in Atomic Mass Spectrometry and 2 years applicable experience~~ |
| ~~Atomic Emission Spectroscopy Technical Supervisors b~~ | ~~B.S. and specialized training in Atomic Emission Spectroscopy and 2 years applicable experience.~~ |

~~a Based on requirements contained in *USEPA Contract Laboratory Program Statement of Work for Organics Analysis* (Document Number OLM 01.0) and *Statement of Work for Inorganics Analysis* (Document Number ILM 03.0).~~

~~b Technical Supervisors are those persons responsible for the overall technical operation and development of a specific laboratory technique. QAPjPs shall include the site-specific title for this position.~~

~~c~~a Operators are those persons responsible for the actual operation of ~~analytical~~ testing equipment. QAPjPs shall include the site-specific title for this position.

**Table C3-~~11~~3**
**Testing Batch Data Report Contents**

| Required Information | Radiography | Visual Examination | Comment |
|---|---|---|---|
| Batch Data Report Date | X | X | |
| Batch number | X | X | |
| Waste container number | X | X | |
| Waste stream name and/or number | O | O | |
| Waste Matrix Code | X | X | Summary Category Group included in waste matrix code |
| Implementing procedure (specific version used) | X | X | If procedure cited contains more than one method, the method used must also be cited. Can use revision number, date, or other means to track specific version used. |
| Container type | O | O | Drums, Standard Waste Box, Ten Drum Overpack, etc. |
| Video media reference | X | X | Reference to Video media applicable to each container. For visual examination of newly generated waste, video media not required if two trained operators review the contents of the waste container to ensure correct reporting. |
| Imaging check | O | | |
| Camera check | | O | |
| Audio check | O | O | |
| QC documentation | X | X | |
| Verification that the physical form matches the waste stream description and Waste Matrix Code. | X | X | Summary Category Group included in waste matrix code |
| Comments | X | X | |
| Reference to or copy of associated NCRs, if any | X | X | Copies of associated NCRs must be available. |
| Verify absence of prohibited items | X | X | |
| Operator signature and date of test | X | X | Signatures of both operators required for Visual Verification of Acceptable Knowledge |
| Data review checklists | X | X | All data review checklists will be identified |

LEGEND:

X - Required in batch data report.

O - Information must be documented and traceable; inclusion in batch data report is optional.

~~Table C3-12~~
~~Sampling Batch Data Report Contents~~

| ~~Required Information~~ | ~~Headspace Gas~~ | ~~Solid Sampling~~ | ~~Comment~~ |
|---|---|---|---|
| ~~Batch Data Report Date~~ | ~~X~~ | ~~X~~ | |
| ~~Batch number~~ | ~~X~~ | ~~X~~ | |
| ~~Waste stream name and/or number~~ | ~~O~~ | ~~O~~ | |
| ~~Waste Matrix Code~~ | | ~~X~~ | ~~Summary Category Group included in Waste Matrix Code~~ |
| ~~Procedure (specific version used)~~ | ~~X~~ | ~~X~~ | ~~If procedure cited contains more than one method, the method used must also be cited. Can use revision number, date, or other means to track specific version used.~~ |
| ~~Container number~~ | ~~X~~ | ~~X~~ | |
| ~~Container type~~ | ~~O~~ | ~~O~~ | ~~Drums, Standard Waste Box, Ten Drum Overpack, etc.~~ |
| ~~Sample matrix and type~~ | ~~X~~ | ~~X~~ | |
| ~~Analyses requested and laboratory~~ | ~~X~~ | ~~X~~ | |
| ~~Point of origin for sampling~~ | ~~X~~ | ~~X~~ | ~~Location where sample was taken (e.g., building number, room)~~ |
| ~~Sample number~~ | ~~X~~ | ~~X~~ | |
| ~~Sample size~~ | ~~X~~ | ~~X~~ | |
| ~~Sample location~~ | ~~X~~ | ~~X~~ | ~~Location within container where sample is taken. (For HSG, specify what layer of confinement was sampled. For solids, physical location within container.)~~ |
| ~~Sample preservation~~ | ~~X~~ | ~~X~~ | |
| ~~Person collecting sample~~ | ~~X~~ | ~~X~~ | |
| ~~Person attaching custody seal~~ | ~~O~~ | ~~O~~ | ~~May or may not be the same as the person collecting the sample~~ |

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| ~~Required Information~~ | ~~Headspace Gas~~ | ~~Solid Sampling~~ | ~~Comment~~ |
|---|---|---|---|
| ~~Chain of custody record~~ | ~~X~~ | ~~X~~ | ~~Original or copy is allowed~~ |
| ~~Sampling equipment numbers~~ | ~~X~~ | ~~X~~ | ~~For disposable equipment, a reference to the lot~~ |
| ~~Drum age~~ | ~~X~~ | | ~~Must include all supporting determinative information, including but not limited to packaging date, equilibrium start time, storage temperature, and sampling date/time. If Scenario 3 is used, the packaging configuration, filter diffusivity, liner presence/absence, and rigid liner vent hole diameter used in determining the DAC must be documented. If Scenario 1 and 2 are used together, the filter diffusivity and rigid liner vent hole diameter used in determining the DAC must be documented. If default values are used for retrievably stored waste, these values must clearly be identified as such.~~ |
| ~~Cross-reference of sampling equipment numbers with associated cleaning batch numbers~~ | ~~O~~ | ~~X~~ | ~~As applicable to the equipment used for the sampling. For disposable equipment, a reference to the lot and procurement records to support cleanliness is sufficient~~ |
| ~~Drum age~~ | ~~X~~ | | |
| ~~Equilibration time~~ | ~~X~~ | | |
| ~~Verification of rigid liner venting~~ | ~~X~~ | | ~~Only applicable to containers with rigid liners~~ |
| ~~Verification that sample volume taken is small in comparison to the available volume~~ | ~~X~~ | | ~~Must include headspace gas volume when it can be estimated~~ |
| ~~Scale Calibration~~ | | ~~O~~ | |

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| ~~Required Information~~ | ~~Headspace Gas~~ | ~~Solid Sampling~~ | ~~Comment~~ |
|---|---|---|---|
| ~~Depth of waste~~ | | ~~X~~ | ~~For newly generated waste, if a sampling method other than coring is used, this is replaced by documentation that a representative sample has been taken.~~ |
| ~~Calculation of core recovery~~ | | ~~X~~ | ~~For newly generated waste, if a sampling method other than coring is used, this is replaced by documentation that a representative sample has been taken.~~ |
| ~~Co-located core description~~ | | ~~X~~ | ~~For newly generated waste, if a sampling method other than coring is used, this is replaced by documentation that a QC sample has been taken.~~ |
| ~~Time between coring and subsampling~~ | | ~~X~~ | ~~Only applicable to coring.~~ |
| ~~OVA calibration and reading~~ | ~~O~~ | | ~~Only applicable to manifold systems. Must be done in accordance with manufacturer's specifications~~ |
| ~~Field Records~~ | ~~X~~ | ~~X~~ | ~~Must contain the following as applicable to the sampling method used: Collection problems, Sequence of sampling collection, Inspection of the solids sampling area, Inspection of the solids sampling equipment, Coring tool test, random location of sub-sample, canister pressure, and ambient temperature and pressure.~~ |
| ~~Reference to or copy of associated NCRs, if any~~ | ~~X~~ | ~~X~~ | ~~Copies of associated NCRs must be available.~~ |
| ~~Operator Signature and date and time of sampling~~ | ~~X~~ | ~~X~~ | |
| ~~Data review checklists~~ | ~~X~~ | ~~X~~ | ~~All data review checklists will be identified~~ |

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| ~~Required Information~~ | ~~Headspace Gas~~ | ~~Solid Sampling~~ | ~~Comment~~ |
|---|---|---|---|

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~~**LEGEND:**~~

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~~**X - Required in batch data report.**~~

~~**O - Information must be documented and traceable; inclusion in batch data report is optional.**~~

~~Table C3-13~~
~~Analytical Batch Data Report Contents~~

| ~~Required Information~~ | ~~Headspace Gas~~ | ~~Solid Sampling~~ | ~~Comment~~ |
|---|---|---|---|
| ~~Batch Data Report Date~~ | ~~X~~ | ~~X~~ | |
| ~~Batch number~~ | ~~X~~ | ~~X~~ | |
| ~~Sample numbers~~ | ~~X~~ | ~~X~~ | |
| ~~QC designation for sample~~ | ~~X~~ | ~~X~~ | |
| ~~Implementing procedure (specific version used)~~ | ~~X~~ | ~~X~~ | ~~If procedure cited contains more than one method, the method used must also be cited. Can use revision number, date, or other means to track specific version used.~~ |
| ~~QC sample results~~ | ~~X~~ | ~~X~~ | |
| ~~Sample data forms~~ | ~~X~~ | ~~X~~ | ~~Form should contain reduced data for target analytes and TICs~~ |
| ~~Chain of custody~~ | ~~X~~ | ~~X~~ | ~~Original or copy~~ |
| ~~Gas canister tags~~ | ~~X~~ | | ~~Original or copy~~ |
| ~~Sample preservation~~ | ~~X~~ | ~~X~~ | |
| ~~Holding time~~ | | ~~X~~ | |
| ~~Cross-reference of field numbers to laboratory sample numbers~~ | ~~X~~ | ~~X~~ | |
| ~~Date and time analyzed~~ | ~~X~~ | ~~X~~ | |
| ~~Verification of spectra used for results~~ | ~~O~~ | ~~O~~ | ~~Analyst must qualitatively evaluate the validity of the results based on the spectra, can be implemented as a check box for each sample~~ |
| ~~TIC evaluation~~ | ~~X~~ | ~~X~~ | |
| ~~Reporting flags, if any~~ | ~~X~~ | ~~X~~ | ~~Table C3-14 lists applicable flags~~ |
| ~~Case narrative~~ | ~~X~~ | ~~X~~ | |
| ~~Reference to or copy of associated NCRs, if any~~ | ~~X~~ | ~~X~~ | ~~Copies of associated NCRs must be available.~~ |

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| | | | |
|---|---|---|---|
| ~~**Operator signature and analysis date**~~ | ~~**X**~~ | ~~**X**~~ | |
| ~~**Data review checklists**~~ | ~~**X**~~ | ~~**X**~~ | ~~**All data review checklists will be identified**~~ |

~~**LEGEND:**~~

~~**X - Required in batch data report.**~~

~~**O - Information must be documented and traceable; inclusion in batch data report is optional.**~~

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~~**Table C3-14**~~
~~**Data Reporting Flags**~~

| ~~**Data Flag**~~ | ~~**Indicator**~~ |
|---|---|
| ~~**B**~~ | ~~**Analyte detected in blank (Organics/ Headspace gases)**~~ |
| ~~**B**~~ | ~~**Analyte blank concentration greater than or equal to 20 percent of sample concentration prior to dilution corrections (Metals)**~~ |
| ~~**E**~~ | ~~**Analyte exceeds calibration curve (Organics/ Headspace gases)**~~ |
| ~~**J**~~ | ~~**Analyte less than PRQL but greater than or equal to MDL (Organics/ Headspace gases)**~~ |
| ~~**J**~~ | ~~**Analyte greater than or equal to IDL but less than 5 times the IDL before dilution correction (Metals)**~~ |
| ~~**U**~~ | ~~**Analyte was not detected and value is reported as the MDL (IDL for Metals)**~~ |
| ~~**D**~~ | ~~**Analyte was quantitated from a secondary dilution, or reduced sample aliquot (Organics/ Headspace gases)**~~ |
| ~~**Z**~~ | ~~**One or more QC samples do not meet acceptance criteria**~~ |
| ~~**H**~~ | ~~**Holding time exceeded**~~ |

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# ~~FIGURES~~

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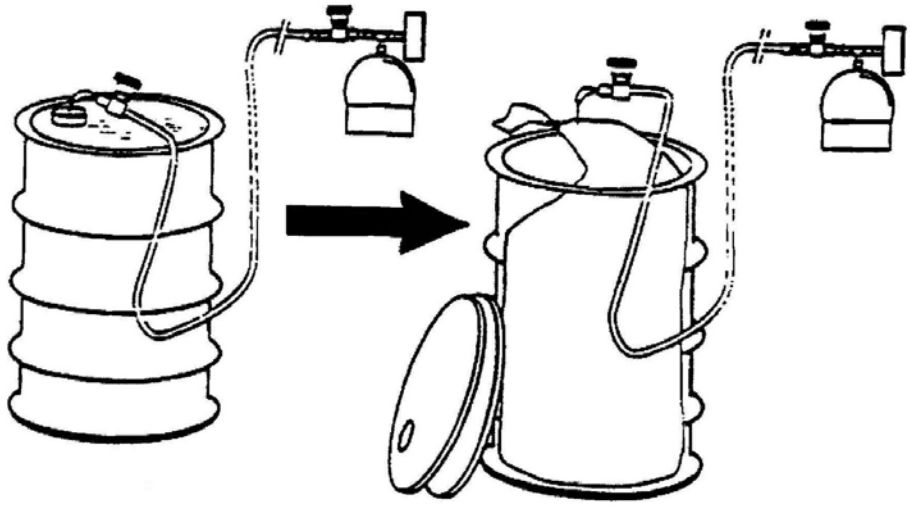

~~**Figure C3-1**~~
~~**Overall Headspace Gas Sampling Scheme Illustrating Manifold Sampling**~~

# ATTACHMENT C4

# TRU MIXED WASTE CHARACTERIZATION USING ACCEPTABLE KNOWLEDGE

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# ATTACHMENT C4

# TRU MIXED WASTE CHARACTERIZATION USING ACCEPTABLE KNOWLEDGE

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# ATTACHMENT C4

# TRU MIXED WASTE CHARACTERIZATION USING ACCEPTABLE KNOWLEDGE

## C4-1 Introduction

The Resource Conservation and Recovery Act (**RCRA**) regulations codified in 40 CFR Parts 260 through 265, 268, and 270, and the New Mexico Hazardous Waste Management Regulations in 20.4.1 NMAC Subparts 100 through 600, Subpart 800, and Subpart 900, authorize the use of acceptable knowledge (**AK**) in appropriate circumstances by waste generators, or treatment, storage, or disposal facilities to characterize hazardous waste. Acceptable knowledge is described in *Waste Analysis: EPA Guidance Manual for Facilities That Generate, Treat, Store and Dispose of Hazardous Waste* (EPA, 1994). Acceptable knowledge, as an alternative to sampling and analysis, can be used to meet all or part of the waste characterization requirements under the RCRA (EPA, 1994).

EPA's 1994 Waste Analysis Guidance Manual broadly defines the term "acceptable knowledge" to include process knowledge, whereby detailed information on the wastes is obtained from existing published or documented waste analysis data or studies conducted on hazardous waste generated by processes similar to that which generated the waste; facility records of analysis performed before the effective date of RCRA; and waste analysis data obtained from generators of similar wastes that send their wastes off-site for treatment, storage, or disposal (EPA, 1994). If a generator/storage site determines that AK alone is insufficient to accurately characterize a waste, the site may use radiography and/or visual examination (specified in Permit Attachment C1) to complete the waste characterization process and satisfy the requirements of the Waste Analysis Plan (**WAP**) specified in Permit Attachment C. Acceptable knowledge is used in TRU mixed waste characterization activities in five ways:

- To delineate TRU mixed waste streams
- To assess whether TRU mixed wastes comply with the applicable requirements of the Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**)
- To assess whether TRU mixed wastes exhibit a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart C)
- To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart D)
- To estimate waste material parameter weights

Radiography and/or VE may be performed to augment the characterization of wastes based on acceptable knowledge when an AK Sufficiency Determination has not been requested by the generator/storage site or, if requested, has not been granted by the U.S. Department of Energy (**DOE**) (see Section C4-3d). TRU mixed waste streams shall undergo applicable provisions of the acceptable knowledge process prior to management, storage, or disposal by the Permittees at WIPP.

## C4-2 Acceptable Knowledge Documentation

The Permittees shall obtain from each DOE TRU mixed waste generator/storage site (**site**) a logical sequence of acceptable knowledge information that progresses from general facility information (TRU Mixed Waste Management Program Information) to more detailed waste-specific information (TRU Mixed Waste Stream Information). Traceability of acceptable knowledge information for a selected container in the audited Waste Summary Category Group(s) will be examined during DOE's audit of a site (Section C4-3g). The consistent presentation of acceptable knowledge documentation among sites in auditable records[1] will allow DOE to verify the completeness and adequacy of acceptable knowledge for TRU mixed waste characterization during the audit process. The Permittees shall require sites to implement the acceptable knowledge process as specified in this Permit to characterize TRU mixed wastes and obtain sufficient waste characterization data to demonstrate compliance with the Permit. The New Mexico Environment Department (**NMED**) may independently validate the implementation of and compliance with applicable provisions of the WAP at each generator/storage site by participation in the Audit and Surveillance Program (Permit Attachment C6). DOE shall provide NMED with current audit schedules and notify NMED in writing no later than thirty (30) calendar days prior to each audit. NMED may choose to accompany DOE on any audit of the WAP implementation.

The following sections include the information the Permittees will require for each site to characterize TRU mixed waste using acceptable knowledge. Because waste generating processes are site-specific, sites shall, as necessary, augment the required acceptable knowledge records with additional supporting information (see Section C4-2c, Additional Acceptable Knowledge Information). If the required information is not available for a particular waste stream, the waste stream will not be eligible for an AK Sufficiency Determination as specified in Section C4-3d.

### C4-2a Required TRU Mixed Waste Management Program Information

TRU mixed waste management program information shall clearly define waste categorization schemes and terminology, provide a breakdown of the types and quantities of TRU mixed waste that are generated and stored at the site, and describe how waste is tracked and managed at the site, including historical and current operations. Information related to TRU mixed waste certification procedures and the types of documentation (e.g., waste profile forms) used to summarize acceptable knowledge shall also be provided. The following information shall be included as part of the acceptable knowledge written record:

- Map of the site with the areas and facilities involved in TRU mixed waste generation, treatment, and storage identified

- Facility mission description as related to TRU mixed waste generation and management (e.g., nuclear weapons research may involve metallurgy, radiochemistry, and nuclear physics operations that result in specific waste streams)

[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.

- Description of the operations that generate TRU mixed waste at the site (e.g., plutonium recovery, weapons design, or weapons fabrication)
- Waste identification or categorization schemes used at the facility (e.g., item description codes, content codes)
- Types and quantities of TRU mixed waste generated, including historical generation through future projections
- Correlation of waste streams generated from the same building and process, as appropriate (e.g., sludge, combustibles, metals, and glass)
- Waste certification procedures for retrievably stored and newly generated wastes to be sent to the WIPP facility

C4-2b Required TRU Mixed Waste Stream Information

Sites may use acceptable knowledge to delineate site-specific waste streams. For each TRU mixed waste stream, the Permittees shall require sites to compile all process information and data that support the acceptable knowledge used to characterize that waste stream. The type and quantity of supporting documentation will vary by waste stream, depending on the process generating the waste and site-specific requirements imposed by the Permittees. At a minimum, the waste process information shall include the following written information:

- Area(s) and/or building(s) from which the waste stream was or is generated
- Waste stream volume and time period of generation (e.g., 100 standard waste boxes of retrievable stored waste generated from June 1977 through December 1977)
- Waste generating process described for each building (e.g., batch waste stream generated during decommissioning operations of glove boxes), including processes associated with U134 waste generation, if applicable.
- Documentation regarding how the site has historically managed the waste, including the historical regulatory status of the waste (i.e., TRU mixed versus TRU non-mixed waste)
- Process flow diagrams (e.g., a diagram illustrating glove boxes from a specific building to a size reduction facility to a container storage area). In the case of research/development, analytical laboratory waste, or other similar processes where process flow diagrams cannot be created, a description of the waste generating processes, rather than a formal process flow diagram, may be included if this modification is justified and the justification is placed in the auditable record
- Material inputs or other information that identifies the chemical content of the waste stream and the physical waste form (e.g., glove box materials and chemicals handled during glove box operations; events or processes that may have modified the chemical or physical properties of the waste stream after generation; data obtained through visual examination of newly generated waste that later undergoes radiography;

information demonstrating neutralization of U134 [hydrofluoric acid] and waste compatibility)

The acceptable knowledge written record shall include a summary that identifies all sources of waste characterization information used to delineate the waste stream. The basis and rationale for delineating each waste stream, based on the parameters of interest, shall be clearly summarized and traceable to referenced documents. Assumptions made in delineating each waste stream also shall be identified and justified. If discrepancies exist between required information, then sites may consider applying all hazardous waste numbers indicated by the information to the subject waste stream, but must assess and evaluate the information to determine the appropriate hazardous waste numbers consistent with RCRA requirements. The Permittees shall obtain from each site, at a minimum, procedures that comply with the following acceptable knowledge requirements:

- Procedures for identifying and assigning the physical waste form of the waste
- Procedures for delineating waste streams and assigning Waste Matrix Codes
- Procedures for resolving inconsistencies in acceptable knowledge documentation
- Procedures for visual examination and/or radiography, if applicable
- For newly generated waste, procedures describing process controls used to ensure prohibited items (specified in the WAP, Permit Attachment C) are documented and managed
- Procedures to ensure radiography and visual examination include a list of prohibited items that the operator shall verify are not present in each container (e.g., liquid exceeding TSDF-WAC limits, corrosives, ignitables, reactives, and incompatible wastes)
- Procedures to document how changes to Waste Matrix Codes, waste stream assignment, and associated Environmental Protection Agency (**EPA**) hazardous waste numbers based on material composition are documented for any waste
- Procedures that ensure the assignment of EPA hazardous waste numbers is appropriate, consistent with RCRA requirements, and considers site historical waste management
- Procedures for estimating waste material parameter weights

### C4-2c Additional Acceptable Knowledge Information

The generator/storage sites shall obtain additional acceptable knowledge information. Sites shall collect information as appropriate to augment required information and provide any other information obtained to further delineate waste streams. Adequacy of this information shall be assessed by DOE during audits (Section C4-3g). Sites will use this information to compile the acceptable knowledge written record.

All additional specific, relevant acceptable knowledge documentation assembled and used in the acceptable knowledge process, whether it supports or contradicts any required acceptable knowledge documentation, shall be identified and an explanation provided for its use (e.g., identification of a toxicity characteristic). Additional documentation may be used to further document the rationale for the hazardous characterization results. The collection and use of additional information shall be assessed by DOE during site audits to ensure that hazardous waste characterization is supported, as necessary, by such information. Similar to required information, if discrepancies exist between additional information and the required information, then sites may consider applying all hazardous waste numbers indicated by the additional information to the subject waste stream, but must assess and evaluate the information to determine the appropriate hazardous waste numbers consistent with RCRA requirements. All information considered must be documented and placed in the auditable record, including applicable discrepancy resolution documentation.

Additional acceptable knowledge documentation includes, but is not limited to, the following information:

- Process design documents (e.g., Title II Design)
- Standard operating procedures that may include a list of raw materials or reagents, a description of the process or experiment generating the waste, and a description of wastes generated and how the wastes are managed at the point of generation
- Preliminary and final safety analysis reports and technical safety requirements
- Waste packaging records
- Test plans or research project reports that describe reagents and other raw materials used in experiments
- Site databases (e.g., chemical inventory database for Superfund Amendments and Reauthorization Act Title III requirements)
- Information from site personnel (e.g., documented interviews)
- Standard industry documents (e.g., vendor information)
- Analytical data relevant to the waste stream, including results from fingerprint analyses, spot checks, routine verification sampling, or other processes that collect information pertinent to the waste stream. This may also include new information which augments required information (e.g., visual examination not performed in compliance with the WAP, radiography screening for prohibited items)
- Material Safety Data Sheets, product labels, or other product package information
- Sampling and analysis data from comparable or surrogate waste streams (e.g., equivalent nonradioactive materials)

- Laboratory notebooks that detail the research processes and raw materials used in an experiment

## C4-3 Acceptable Knowledge Training, Procedures and Other Requirements

The Permittees shall require consistency among sites in using acceptable knowledge information to characterize TRU mixed waste by the use of the following: 1) compiling the required and additional acceptable knowledge documentation in an auditable record, 2) auditing acceptable knowledge records, and 3) WSPF approval and waste confirmation. This section specifies qualification and training requirements, describes each phase of the process, specifies the procedures that the Permittees shall require all sites to develop to implement the requirements for using acceptable knowledge, and specifies data quality requirements for acceptable knowledge.

### C4-3a Qualifications and Training Requirements

Site personnel responsible for compiling acceptable knowledge, assessing acceptable knowledge, and resolving discrepancies associated with acceptable knowledge shall be qualified and trained in the following areas at a minimum:

- WIPP WAP in Permit Attachment C and the TSDF-WAC specified in this permit
- State and Federal RCRA regulations associated with solid and hazardous waste characterization
- Discrepancy resolution and reporting processes
- Site-specific procedures associated with waste characterization using acceptable knowledge

### C4-3b Acceptable Knowledge Assembly and Compilation

The Permittees shall obtain from sites acceptable knowledge procedures which require consistent application of the acceptable knowledge process and requirements. Site-specific acceptable knowledge procedures shall address the following:

- Sites shall prepare and implement a written procedure outlining the specific methodology used to assemble acceptable knowledge records, including the origin of the documentation, how it will be used, and any limitations associated with the information (e.g., identify the purpose and scope of a study that included limited sampling and analysis data).
- Sites shall develop and implement a written procedure to compile the required acceptable knowledge record.
- Sites shall develop and implement a written procedure that ensures unacceptable wastes (e.g., reactive, ignitable, corrosive) are identified and segregated from TRU mixed waste populations sent to WIPP.

- Sites shall prepare and implement a written procedure to evaluate acceptable knowledge and resolve discrepancies. For example, if different sources of information indicate different hazardous wastes are present, then sites shall include all sources of information in its records and may choose to either conservatively assign hazardous waste numbers or assign only those numbers deemed appropriate and consistent with RCRA requirements. All information used to justify assignment of hazardous waste numbers must be placed in the auditable record. Further, the assignment of hazardous waste numbers shall be tracked in the auditable record to all required documentation.

- Sites shall prepare and implement a written procedure to identify hazardous wastes and assign the appropriate hazardous waste numbers to each waste stream. The following are minimum baseline requirements/standards that site-specific procedures shall include to ensure comparable and consistent characterization of hazardous waste:

  - Compile all of the required information in an auditable record.

  - Review the compiled information and delineate waste streams. Delineation of waste streams must comply with the definition in Permit Attachment C, Section C-0a, and justify combining waste historically managed separately as TRU mixed and TRU non-mixed waste streams into a single waste stream.

  - Review the compiled information to determine if the waste stream is compliant with the TSDF-WAC.

  - Review the required information to determine if the waste is listed under 20.4.1.200 NMAC (incorporating 40 CFR §261), Subpart D. Assign all listed hazardous waste numbers unless the sites choose to justify an alternative assignment and document the justification in the auditable record.

  - Review the required information to determine if the waste exhibits a hazardous characteristic or may contain hazardous constituents included in the toxicity characteristics specified in 20.4.1.200 NMAC (incorporating 40 CFR §261), Subpart C. If a toxicity characteristic contaminant is identified and is not included as a listed waste, sites may evaluate available data and assign the toxicity characteristic hazardous waste number consistent with RCRA requirements. All data examined to reach the hazardous waste number determination must be placed in the auditable record and must present a clear justification for the hazardous waste number analyses.

  - Review the compiled information to provide an estimate of material parameter weights for each container to be stored or disposed of at WIPP.

  For newly generated wastes, procedures shall be developed and implemented to characterize hazardous waste using acceptable knowledge prior to packaging the waste.

- Sites shall ensure that results of audits of the TRU mixed waste characterization programs at the site are available in the records.

- Sites shall identify all process controls (implemented to ensure that the waste contains no prohibited items and to control hazardous waste content and/or physical form) that may have been applied to retrievably stored waste and/or may presently be applied to newly generated waste. Process controls are applied at the time of waste generation/packaging to control waste content, whereas any activities performed after waste generation/packaging to identify prohibited items, hazardous waste content, or physical form are waste characterization activities, not process controls. The AK record must contain specific process controls and supporting documentation identifying when these process controls are used to control waste content. See Permit Attachment C, Section C-2 for programmatic requirements related to process controls.

### C4-3c Criteria for Assembling an Acceptable Knowledge Record and Delineating the Waste Stream

Figure C4-1 provides an overview of the process for assembling acceptable knowledge documentation into an auditable record. The first step is to assemble all of the required acceptable knowledge information and any additional information regarding the materials and processes that generate a specific waste stream. The Permittees shall require the sites to implement procedures which comply with the following criteria to establish acceptable knowledge records:

- Acceptable knowledge information shall be compiled in an auditable record, including a road map for all applicable information.

- The overview of the facility and TRU mixed waste management operations in the context of the facility's mission shall be correlated to specific waste stream information.

- Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities shall be clearly described. For newly generated wastes, the rate and quantity of waste to be generated shall be defined.

- A reference list shall be provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support the acceptable knowledge information.

Container inventories for TRU mixed waste currently in retrievable storage shall be delineated into waste streams by correlating the container identification to all of the required acceptable knowledge information and any additional acceptable knowledge information.

### C4-3d AK Sufficiency Determination Request Contents

Generator/storage sites may submit an AK Sufficiency Determination Request (**Determination Request**) to meet all or part of the waste characterization requirements. The Determination Request shall include, at a minimum:

- A complete AK Summary that addresses the following technical requirements:

  - Executive Summary;

- Waste Stream Identification Summary, including a demonstration that the waste stream has been properly delineated and meets the Permit definition of waste stream (Permit Attachment C, Introduction);

- Mandatory Program Information (including, but not limited to, facility location and description, mission, defense waste assessment, spent nuclear fuel and high-level waste assessment, description of waste generating processes, research/development [as necessary], facility support operations [as applicable], types and quantities of TRU waste generated, correlation of waste streams to buildings/processes, waste identification and categorization, physical form identifiers);

- Mandatory Waste Stream Information (including, but not limited to, Area and Building of Generation, waste stream volume/period of generation (including, for newly generated waste, the rate and quantity of waste to be generated), waste generating activities, types of waste generated, material input related to physical form and identification of percentage of each waste material parameter in the waste stream, chemical content information including hazardous constituents and hazardous waste identification, prohibited item content (including documented evidence that the waste meets the TSDF-WAC Permit Sections 2.3.3.1 through 2.3.3.10), waste packaging, presence of filter vents, number of layers of confinement);

- Types of additional information gathered;

- Container specific data (if available and relevant); and

- A complete reference list including all mandatory and additional information.

- An AK roadmap (defined as a cross reference between mandatory programmatic and mandatory waste stream information, with references supporting these requirements).

- A complete reference list including all mandatory and additional documentation.

- Additional relevant information for the required programmatic and waste stream data addressed in the AK Summary, examples of which are presented in Permit Attachment C4, Section C4-2c.

- Identification of any mandatory requirements supported only by upper tier documents (i.e., there is insufficient supporting data).

- Description or other means of demonstrating that the AK process described in the Permit was followed (for example, AK personnel were appropriately trained; discrepancies were documented, etc).

- Information showing that the generator/storage site has developed a written procedure for compiling the AK information and assigning hazardous waste numbers as required in Permit Attachment C4-3b.

- Information showing that the generator/storage site has assessed the AK process (e.g. internal audits, Permit Attachment C4-3b).

The Permittees shall evaluate the Determination Request for completeness and technical adequacy as specified in Permit Attachment C.

C4-3e Requirements for Re-evaluating Acceptable Knowledge Information

Acceptable knowledge includes information regarding the physical form of the waste, the base materials composing the waste, and the process that generates the waste. Waste testing (i.e., radiography or visual examination) may be used to augment acceptable knowledge information.

The Waste Stream Profile Form (**WSPF**) and Characterization Information Summary (including the acceptable knowledge summary) will be reviewed by the Permittees for each waste stream prior to DOE approval of the WSPF. The Permittees' review will ensure that the submitted AK information was collected under procedures that ensure implementation of the WAP, provides data sufficient to meet the DQOs in Section C-4a(1), and allow the Permittees to demonstrate compliance with the waste analysis requirements of the Permit. A detailed discussion of the Permittees' waste stream review and DOE's WSPF approval process is provided in Section C-1d.

The Permittees shall require sites to establish procedures for reevaluating acceptable knowledge if the results of waste confirmation indicate that the waste to be shipped does not match the approved waste stream, or if data obtained from radiography or visual examination for waste streams without an AK Sufficiency Determination exhibit this discrepancy. Site procedures shall describe how the waste is reassigned, acceptable knowledge reevaluated, and appropriate hazardous waste numbers assigned. If the reevaluation requires that the Waste Matrix Code be changed for the waste stream or the waste does not match the approved waste stream, the following minimum steps shall be taken to reevaluate acceptable knowledge:

- Review existing information based on the container identification number and document all differences in hazardous waste number assignments

- If differences exist in the hazardous waste numbers that were assigned, reassess and document all required acceptable knowledge information (Section C4-3b) associated with the new designation

- Reassess and document all testing data associated with the waste

- Verify and document that the reassigned Waste Matrix Code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination

- Record all changes to acceptable knowledge records

- If discrepancies exist in the acceptable knowledge information for the revised Waste Matrix Code, document the segregation of the affected portion of the waste stream, and define the actions necessary to fully characterize the waste

## C4-3f Acceptable Knowledge Data Quality Requirements

The data quality objectives for testing techniques are provided in Permit Attachment C3. Testing results will be used to augment the characterization of wastes based on acceptable knowledge. To ensure that the acceptable knowledge process is consistently applied, the Permittees shall require sites to comply with the data quality requirements for acceptable knowledge documentation in Permit Attachment C3.

Each site shall address quality control by tracking its performance with regard to the use of acceptable knowledge by: 1) assessing the frequency of inconsistencies among information, and 2) documenting the results of waste discrepancies identified by the generator/storage site during waste characterization or the Permittees during waste confirmation using radiography, review of radiography audio/video recordings, visual examination, or review of visual examination records. In addition, the acceptable knowledge process and waste stream documentation shall be evaluated through internal assessments by generator/storage site quality assurance organizations.

## C4-3g Audits of Acceptable Knowledge

DOE will conduct an initial audit of each site prior to certifying the site for shipment of TRU mixed waste to the WIPP facility. This initial audit will establish an approved baseline that will be reassessed annually DOE. These audits will verify compliance with the requirements specified in the WAP (Permit Attachment C). The audits will be used to verify compliance with the compilation, application, and interpretation requirements of acceptable knowledge information specified in this Permit at all sites, and to evaluate the completeness and defensibility of site-specific acceptable knowledge documentation related to hazardous waste characterization. Permit Attachment C6 gives a description of the overall audit program and a required checklist. Figure C4-2 includes the primary steps associated with the audit process of acceptable knowledge.

Site-specific audit plans will be prepared by DOE and provided to NMED, and will identify the scope of the audit, requirements to be assessed, participating personnel, activities to be audited, organizations to be notified, applicable documents, and schedule. Audits will be performed in accordance with written procedures and site-specific checklists that will be developed by DOE prior to the audit and provided to NMED. The site-specific audit checklists will include items associated with the compilation and evaluation of the required acceptable knowledge information as specified in the checklist required by Permit Attachment C6.

Audit checklists shall include Table C6-3 in Permit Attachment C6, and will include but not be limited to the following elements for review during the audit:

- Documentation of the process used to compile, evaluate, and record acceptable knowledge is available and implemented;
- Personnel qualifications and training are documented;
- All of the required acceptable knowledge documentation specified in Section C4-2 has been compiled in an auditable record;

- All of the required procedures specified in C4-3 have been developed and implemented, including but not limited to:
  - A procedure exists for assigning hazardous waste numbers to waste streams in accordance with Section C4-3;
  - A procedure exists for resolving discrepancies in acceptable knowledge documentation in accordance with Section C4-3; and
- Results of other audits of the TRU mixed waste characterization programs at the site are available in site records.

Members of the audit team will be knowledgeable regarding the required acceptable knowledge information, RCRA regulations and EPA guidance regarding the use of acceptable knowledge for waste characterization, RCRA hazardous waste characterization, and the WAP requirements (Permit Attachment C). Audit team members will be independent of all TRU mixed waste management operations at the site being audited.

Auditors will evaluate acceptable knowledge documentation for at least one waste stream from the Summary Category Group(s) being audited, and will audit acceptable knowledge traceability for at least one container from the audited Summary Category Group(s). For these waste streams, auditors will review all procedures and associated processes developed by the site for documenting the process of compiling acceptable knowledge documentation; correlating information to specific waste inventories; assigning hazardous waste numbers; and identifying, resolving, and documenting discrepancies in acceptable knowledge records. The adequacy of acceptable knowledge procedures and processes will be assessed and any deficiencies in procedures documented in the audit report.

Auditors will review the acceptable knowledge documentation for selected waste streams for logic, completeness, and defensibility. The criteria that will be used by auditors to evaluate the logic and defensibility of the acceptable knowledge documentation include completeness and traceability of the information, consistency of application of information, clarity of presentation, degree of compliance with this Permit Attachment with regard to acceptable knowledge data, nonconformance procedures, and oversight procedures. Auditors will evaluate compliance with written site procedures for developing the acceptable knowledge record. A completeness review will evaluate the availability of all required TRU mixed waste management program information and TRU mixed waste stream information (Section C4-2). Records will be reviewed for correlation to specific waste streams and the basis for characterizing hazardous waste. Auditors will verify that sites include all required information and assigned appropriate hazardous waste numbers as indicated by the acceptable knowledge records and consistent with RCRA requirements. All deficiencies in the acceptable knowledge documentation will be included in the audit report.

Auditors will verify and document that sites use administrative controls and follow written procedures to characterize hazardous waste for newly-generated and retrievably stored wastes. Procedures to document changes in acceptable knowledge documentation and changes to hazardous waste number assignments to specific waste streams also will be evaluated for compliance with the WAP (Permit Attachment C).

After the audit is complete, DOE will provide the site with preliminary results at a close-out meeting. DOE will prepare a final audit report that includes all observations and findings identified during the audit. Sites shall respond to all audit findings and identify corrective actions. Audit results will be included in the final audit report (Permit Attachment C6). If acceptable knowledge procedures do not exist, the required information is not available, or corrective actions (i.e., CARs) are identified associated with acceptable knowledge compilation, and/or hazardous waste characterization, the Permittees will not manage, store, or dispose TRU mixed waste for the subject waste summary category. Management, storage, or disposal of the subject waste summary category at WIPP will not resume until DOE find that all corrective actions have been implemented and the site complies with all applicable requirements of the WAP.

DOE disseminates information regarding TRU mixed waste characterization requirements and program status through the WIPP Home Page. The Permittees will use this web page to disseminate information regarding TRU mixed waste streams, RCRA compliance, and operational and programmatic issues, methods development, and waste characterization information, including the application of acceptable knowledge. DOE is provided the required waste characterization information prior to management, storage, or disposal of that waste at WIPP and also will conduct audits at least annually. The Permittees will maintain an operating record for review during regulatory agency audits. NMED may also review any information relevant to the scope of the audit during site audits. DOE will notify NMED regarding any site's failure to implement corrective actions associated with hazardous waste characterization as specified in Parts 1 and 2 and Permit Attachment C3.

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# FIGURES

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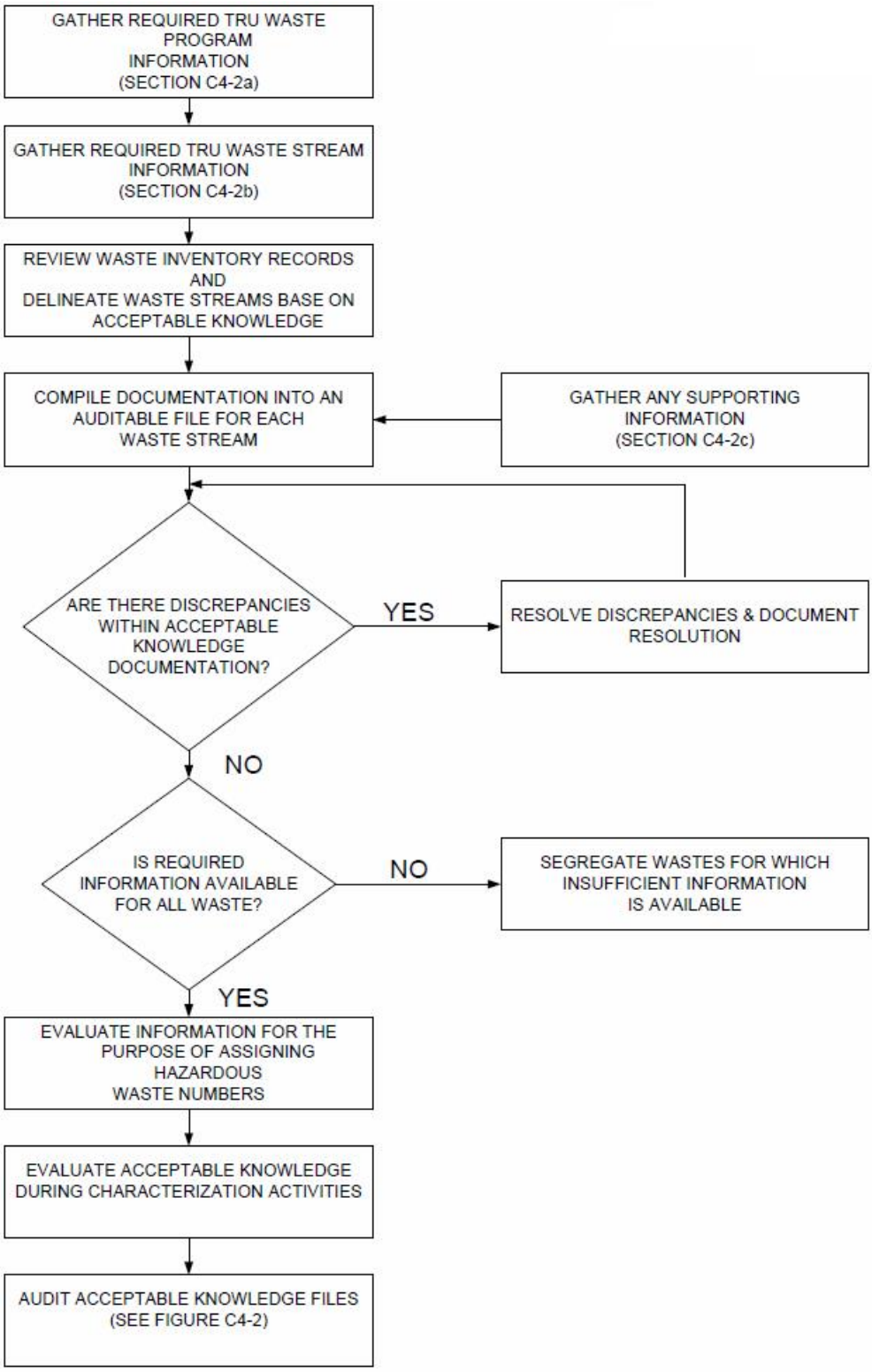


**Figure C4-1**
**Compilation of Acceptable Knowledge Documentation**

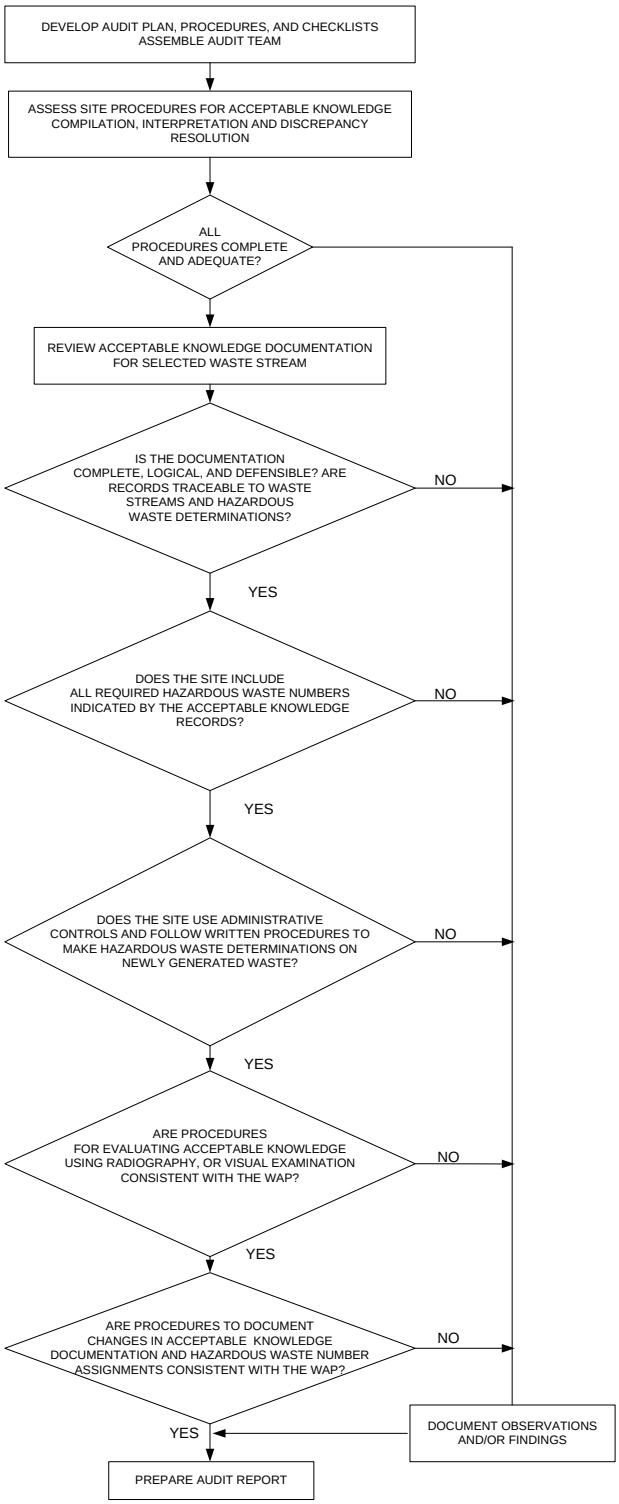


**Figure C4-2**
**Acceptable Knowledge Auditing**

# ATTACHMENT C4

# TRU MIXED WASTE CHARACTERIZATION USING ACCEPTABLE KNOWLEDGE

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# ATTACHMENT C4

# TRU MIXED WASTE CHARACTERIZATION USING ACCEPTABLE KNOWLEDGE

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| Figure | Title |
|---|---|
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# ATTACHMENT C4

# TRU MIXED WASTE CHARACTERIZATION USING ACCEPTABLE KNOWLEDGE

## C4-1 Introduction

The Resource Conservation and Recovery Act (**RCRA**) regulations codified in 40 CFR Parts 260 through 265, 268, and 270, and the New Mexico Hazardous Waste Management Regulations in 20.4.1 NMAC Subparts 100 through 600, Subpart 800, and Subpart 900, authorize the use of acceptable knowledge (**AK**) in appropriate circumstances by waste generators, or treatment, storage, or disposal facilities to characterize hazardous waste. Acceptable knowledge is described in *Waste Analysis: EPA Guidance Manual for Facilities That Generate, Treat, Store and Dispose of Hazardous Waste* (EPA, 1994). Acceptable knowledge, as an alternative to sampling and analysis, can be used to meet all or part of the waste characterization requirements under the RCRA (EPA, 1994).

EPA's 1994 Waste Analysis Guidance Manual broadly defines the term "acceptable knowledge" to include process knowledge, whereby detailed information on the wastes is obtained from existing published or documented waste analysis data or studies conducted on hazardous waste generated by processes similar to that which generated the waste; facility records of analysis performed before the effective date of RCRA; and waste analysis data obtained from generators of similar wastes that send their wastes off-site for treatment, storage, or disposal (EPA, 1994). If a generator/storage site determines that AK alone is insufficient to accurately characterize a waste, the site may use radiography and/or visual examination~~, headspace gas sampling and analysis, and homogeneous waste sampling and analysis~~ (specified in Permit Attachment C1) to complete the waste characterization process and satisfy the requirements of the Waste Analysis Plan (**WAP**) specified in Permit Attachment C. Acceptable knowledge is used in TRU mixed waste characterization activities in five ways:

- To delineate TRU mixed waste streams
- To assess whether TRU mixed wastes comply with the applicable requirements of the Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**)
- To assess whether TRU mixed wastes exhibit a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart C)
- To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart D)
- To estimate waste material parameter weights

~~Sampling and analysis~~Radiography and/or VE may be performed to augment the characterization of wastes based on acceptable knowledge when an AK Sufficiency Determination has not been requested by the generator/storage site or, if requested, has not been granted by the U.S. Department of Energy (**DOE**) (see Section C4-3d). ~~Sampling and analysis consists of radiography, visual examination, headspace gas, and homogeneous waste sampling and analysis.~~ TRU mixed waste streams shall undergo applicable provisions of the

acceptable knowledge process prior to management, storage, or disposal by the Permittees at WIPP.

C4-2 Acceptable Knowledge Documentation

The Permittees shall obtain from each DOE TRU mixed waste generator/storage site (**site**) a logical sequence of acceptable knowledge information that progresses from general facility information (TRU Mixed Waste Management Program Information) to more detailed waste-specific information (TRU Mixed Waste Stream Information). Traceability of acceptable knowledge information for a selected container in the audited Waste Summary Category Group(s) will be examined during DOE's audit of a site (Section C4-3g). The consistent presentation of acceptable knowledge documentation among sites in auditable records[1] will allow DOE to verify the completeness and adequacy of acceptable knowledge for TRU mixed waste characterization during the audit process. The Permittees shall require sites to implement the acceptable knowledge process as specified in this Permit to characterize TRU mixed wastes and obtain sufficient waste characterization data to demonstrate compliance with the Permit. The New Mexico Environment Department (**NMED**) may independently validate the implementation of and compliance with applicable provisions of the WAP at each generator/storage site by participation in the Audit and Surveillance Program (Permit Attachment C6). DOE shall provide NMED with current audit schedules and notify NMED in writing no later than thirty (30) calendar days prior to each audit. NMED may choose to accompany DOE on any audit of the WAP implementation.

The following sections include the information the Permittees will require for each site to characterize TRU mixed waste using acceptable knowledge. Because waste generating processes are site-specific, sites shall, as necessary, augment the required acceptable knowledge records with additional supporting information (see Section C4-2c, Additional Acceptable Knowledge Information). If the required information is not available for a particular waste stream, the waste stream will not be eligible for an AK Sufficiency Determination as specified in Section C4-3d.

C4-2a Required TRU Mixed Waste Management Program Information

TRU mixed waste management program information shall clearly define waste categorization schemes and terminology, provide a breakdown of the types and quantities of TRU mixed waste that are generated and stored at the site, and describe how waste is tracked and managed at the site, including historical and current operations. Information related to TRU mixed waste certification procedures and the types of documentation (e.g., waste profile forms) used to summarize acceptable knowledge shall also be provided. The following information shall be included as part of the acceptable knowledge written record:

- Map of the site with the areas and facilities involved in TRU mixed waste generation, treatment, and storage identified

[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.

- Facility mission description as related to TRU mixed waste generation and management (e.g., nuclear weapons research may involve metallurgy, radiochemistry, and nuclear physics operations that result in specific waste streams)

- Description of the operations that generate TRU mixed waste at the site (e.g., plutonium recovery, weapons design, or weapons fabrication)

- Waste identification or categorization schemes used at the facility (e.g., item description codes, content codes)

- Types and quantities of TRU mixed waste generated, including historical generation through future projections

- Correlation of waste streams generated from the same building and process, as appropriate (e.g., sludge, combustibles, metals, and glass)

- Waste certification procedures for retrievably stored and newly generated wastes to be sent to the WIPP facility

C4-2b Required TRU Mixed Waste Stream Information

Sites may use acceptable knowledge to delineate site-specific waste streams. For each TRU mixed waste stream, the Permittees shall require sites to compile all process information and data that support the acceptable knowledge used to characterize that waste stream. The type and quantity of supporting documentation will vary by waste stream, depending on the process generating the waste and site-specific requirements imposed by the Permittees. At a minimum, the waste process information shall include the following written information:

- Area(s) and/or building(s) from which the waste stream was or is generated

- Waste stream volume and time period of generation (e.g., 100 standard waste boxes of retrievable stored waste generated from June 1977 through December 1977)

- Waste generating process described for each building (e.g., batch waste stream generated during decommissioning operations of glove boxes), including processes associated with U134 waste generation, if applicable.

- Documentation regarding how the site has historically managed the waste, including the historical regulatory status of the waste (i.e., TRU mixed versus TRU non-mixed waste)

- Process flow diagrams (e.g., a diagram illustrating glove boxes from a specific building to a size reduction facility to a container storage area). In the case of research/development, analytical laboratory waste, or other similar processes where process flow diagrams cannot be created, a description of the waste generating processes, rather than a formal process flow diagram, may be included if this modification is justified and the justification is placed in the auditable record

- Material inputs or other information that identifies the chemical content of the waste stream and the physical waste form (e.g., glove box materials and chemicals handled during glove box operations; events or processes that may have modified the chemical or physical properties of the waste stream after generation; data obtained through visual examination of newly generated waste that later undergoes radiography; information demonstrating neutralization of U134 [hydrofluoric acid] and waste compatibility)

The acceptable knowledge written record shall include a summary that identifies all sources of waste characterization information used to delineate the waste stream. The basis and rationale for delineating each waste stream, based on the parameters of interest, shall be clearly summarized and traceable to referenced documents. Assumptions made in delineating each waste stream also shall be identified and justified. If discrepancies exist between required information, then sites may consider applying all hazardous waste numbers indicated by the information to the subject waste stream, but must assess and evaluate the information to determine the appropriate hazardous waste numbers consistent with RCRA requirements. The Permittees shall obtain from each site, at a minimum, procedures that comply with the following acceptable knowledge requirements:

- Procedures for identifying and assigning the physical waste form of the waste
- Procedures for delineating waste streams and assigning Waste Matrix Codes
- Procedures for resolving inconsistencies in acceptable knowledge documentation
- Procedures for ~~headspace gas sampling and analysis,~~ visual examination and/or radiography, ~~and homogeneous waste sampling and analysis,~~ if applicable
- For newly generated waste, procedures describing process controls used to ensure prohibited items (specified in the WAP, Permit Attachment C) are documented and managed
- Procedures to ensure radiography and visual examination include a list of prohibited items that the operator shall verify are not present in each container (e.g., liquid exceeding TSDF-WAC limits, corrosives, ignitables, reactives, and incompatible wastes)
- Procedures to document how changes to Waste Matrix Codes, waste stream assignment, and associated Environmental Protection Agency (**EPA**) hazardous waste numbers based on material composition are documented for any waste
- Procedures that ensure the assignment of EPA hazardous waste numbers is appropriate, consistent with RCRA requirements, and considers site historical waste management
- Procedures for estimating waste material parameter weights

## C4-2c Additional Acceptable Knowledge Information

The generator/storage sites shall obtain additional acceptable knowledge information. Sites shall collect information as appropriate to augment required information and provide any other information obtained to further delineate waste streams. Adequacy of this information shall be assessed by DOE during audits (Section C4-3g). Sites will use this information to compile the acceptable knowledge written record.

All additional specific, relevant acceptable knowledge documentation assembled and used in the acceptable knowledge process, whether it supports or contradicts any required acceptable knowledge documentation, shall be identified and an explanation provided for its use (e.g., identification of a toxicity characteristic). Additional documentation may be used to further document the rationale for the hazardous characterization results. The collection and use of additional information shall be assessed by DOE during site audits to ensure that hazardous waste characterization is supported, as necessary, by such information. Similar to required information, if discrepancies exist between additional information and the required information, then sites may consider applying all hazardous waste numbers indicated by the additional information to the subject waste stream, but must assess and evaluate the information to determine the appropriate hazardous waste numbers consistent with RCRA requirements. All information considered must be documented and placed in the auditable record, including applicable discrepancy resolution documentation.

Additional acceptable knowledge documentation includes, but is not limited to, the following information:

- Process design documents (e.g., Title II Design)
- Standard operating procedures that may include a list of raw materials or reagents, a description of the process or experiment generating the waste, and a description of wastes generated and how the wastes are managed at the point of generation
- Preliminary and final safety analysis reports and technical safety requirements
- Waste packaging records
- Test plans or research project reports that describe reagents and other raw materials used in experiments
- Site databases (e.g., chemical inventory database for Superfund Amendments and Reauthorization Act Title III requirements)
- Information from site personnel (e.g., documented interviews)
- Standard industry documents (e.g., vendor information)
- Analytical data relevant to the waste stream, including results from fingerprint analyses, spot checks, routine verification sampling, or other processes that collect information pertinent to the waste stream. This may also include new information

which augments required information (e.g., visual examination not performed in compliance with the WAP, radiography screening for prohibited items)

- Material Safety Data Sheets, product labels, or other product package information
- Sampling and analysis data from comparable or surrogate waste streams (e.g., equivalent nonradioactive materials)
- Laboratory notebooks that detail the research processes and raw materials used in an experiment

~~For waste containers that belong to LANL sealed sources waste streams, these containers do not require headspace gas sampling and analysis if the following information is part of the AK documentation:~~

- ~~Documentation that the waste container contents meet the definition of sealed sources per 10 CFR §30.4 and 10 CFR §835.2 (effective January 1, 2004).~~
- ~~Documentation of the certification of the sealed sources as U.S. Department of Transportation Special Form Class 7 (Radioactive) Material per 49 CFR §173.403 (effective October 1, 2003).~~
- ~~Documentation of contamination survey results that validate the integrity of each sealed source per 10 CFR §34.27 (effective January 1, 2004).~~
- ~~AK documentation does not indicate the use of VOCs or VOC-bearing materials as constituents of the sealed sources.~~
- ~~The outer casing of each sealed source must be of a non-VOC bearing material, which must be verified at the time of packaging.~~
- ~~AK Documentation shall also include but shall not be limited to, as available and as necessary to determine the hazardous constituents associated with sealed sources, the following: source manufacturer's sales catalogues, original purchase records, source manufacturer's fabrication documents, source manufacturer's drawings, source manufacturer's fuel capture assembly reports, source manufacturer's operational procedures for cleanliness requirements, source manufacturer's shipping documents, source manufacturer's welding records, transuranic batch material records, and information from national databases (e.g., NMMSS). All of this information may not and need not be available for each source, but sufficient information must be included in the auditable record to derive an adequate understanding of source construction and history to ensure that no VOCs are present in association with the sealed source itself that would render the source hazardous. If AK data indicate that assignment of a hazardous waste number related to organic materials is required in association with a source, this specific source will be assigned to a separate waste stream and that waste stream will be subject to representative headspace gas sampling unless a separate AK Sufficiency Determination is approved by DOE for the waste stream.~~

## C4-3 Acceptable Knowledge Training, Procedures and Other Requirements

The Permittees shall require consistency among sites in using acceptable knowledge information to characterize TRU mixed waste by the use of the following: 1) compiling the required and additional acceptable knowledge documentation in an auditable record, 2) auditing acceptable knowledge records, and 3) WSPF approval and waste confirmation. This section specifies qualification and training requirements, describes each phase of the process, specifies the procedures that the Permittees shall require all sites to develop to implement the requirements for using acceptable knowledge, and specifies data quality requirements for acceptable knowledge.

### C4-3a Qualifications and Training Requirements

Site personnel responsible for compiling acceptable knowledge, assessing acceptable knowledge, and resolving discrepancies associated with acceptable knowledge shall be qualified and trained in the following areas at a minimum:

- WIPP WAP in Permit Attachment C and the TSDF-WAC specified in this permit
- State and Federal RCRA regulations associated with solid and hazardous waste characterization
- Discrepancy resolution and reporting processes
- Site-specific procedures associated with waste characterization using acceptable knowledge

### C4-3b Acceptable Knowledge Assembly and Compilation

The Permittees shall obtain from sites acceptable knowledge procedures which require consistent application of the acceptable knowledge process and requirements. Site-specific acceptable knowledge procedures shall address the following:

- Sites shall prepare and implement a written procedure outlining the specific methodology used to assemble acceptable knowledge records, including the origin of the documentation, how it will be used, and any limitations associated with the information (e.g., identify the purpose and scope of a study that included limited sampling and analysis data).
- Sites shall develop and implement a written procedure to compile the required acceptable knowledge record.
- Sites shall develop and implement a written procedure that ensures unacceptable wastes (e.g., reactive, ignitable, corrosive) are identified and segregated from TRU mixed waste populations sent to WIPP.
- Sites shall prepare and implement a written procedure to evaluate acceptable knowledge and resolve discrepancies. For example, if different sources of information indicate different hazardous wastes are present, then sites shall include all sources of information in its records and may choose to either conservatively assign hazardous

waste numbers or assign only those numbers deemed appropriate and consistent with RCRA requirements. All information used to justify assignment of hazardous waste numbers must be placed in the auditable record. Further, the assignment of hazardous waste numbers shall be tracked in the auditable record to all required documentation.

- Sites shall prepare and implement a written procedure to identify hazardous wastes and assign the appropriate hazardous waste numbers to each waste stream. The following are minimum baseline requirements/standards that site-specific procedures shall include to ensure comparable and consistent characterization of hazardous waste:

  - Compile all of the required information in an auditable record.

  - Review the compiled information and delineate waste streams. Delineation of waste streams must comply with the definition in Permit Attachment C, Section C-0a, and justify combining waste historically managed separately as TRU mixed and TRU non-mixed waste streams into a single waste stream.

  - Review the compiled information to determine if the waste stream is compliant with the TSDF-WAC.

  - Review the required information to determine if the waste is listed under 20.4.1.200 NMAC (incorporating 40 CFR §261), Subpart D. Assign all listed hazardous waste numbers unless the sites choose to justify an alternative assignment and document the justification in the auditable record.

  - Review the required information to determine if the waste exhibits a hazardous characteristic or may contain hazardous constituents included in the toxicity characteristics specified in 20.4.1.200 NMAC (incorporating 40 CFR §261), Subpart C. If a toxicity characteristic contaminant is identified and is not included as a listed waste, sites may evaluate available data and assign the toxicity characteristic hazardous waste number consistent with RCRA requirements. All data examined to reach the hazardous waste number determination must be placed in the auditable record and must present a clear justification for the hazardous waste number analyses.

  - Review the compiled information to provide an estimate of material parameter weights for each container to be stored or disposed of at WIPP.

  For newly generated wastes, procedures shall be developed and implemented to characterize hazardous waste using acceptable knowledge prior to packaging the waste.

- Sites shall ensure that results of audits of the TRU mixed waste characterization programs at the site are available in the records.

- Sites shall identify all process controls (implemented to ensure that the waste contains no prohibited items and to control hazardous waste content and/or physical form) that may have been applied to retrievably stored waste and/or may presently be applied to newly generated waste. Process controls are applied <u>at the time</u> of waste

generation/packaging to control waste content, whereas any activities performed after waste generation/packaging to identify prohibited items, hazardous waste content, or physical form are waste characterization activities, not process controls. The AK record must contain specific process controls and supporting documentation identifying when these process controls are used to control waste content. See Permit Attachment C, Section C-2 for programmatic requirements related to process controls.

### C4-3c Criteria for Assembling an Acceptable Knowledge Record and Delineating the Waste Stream

Figure C4-1 provides an overview of the process for assembling acceptable knowledge documentation into an auditable record. The first step is to assemble all of the required acceptable knowledge information and any additional information regarding the materials and processes that generate a specific waste stream. The Permittees shall require the sites to implement procedures which comply with the following criteria to establish acceptable knowledge records:

- Acceptable knowledge information shall be compiled in an auditable record, including a road map for all applicable information.
- The overview of the facility and TRU mixed waste management operations in the context of the facility's mission shall be correlated to specific waste stream information.
- Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities shall be clearly described. For newly generated wastes, the rate and quantity of waste to be generated shall be defined.
- A reference list shall be provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support the acceptable knowledge information.

Container inventories for TRU mixed waste currently in retrievable storage shall be delineated into waste streams by correlating the container identification to all of the required acceptable knowledge information and any additional acceptable knowledge information.

### C4-3d AK Sufficiency Determination Request Contents

Generator/storage sites may submit an AK Sufficiency Determination Request (**Determination Request**) to meet all or part of the waste characterization requirements. The Determination Request shall include, at a minimum:

- ~~Identification of the scenario for which the approval is sought (Permit Attachment C, Section C-0b).~~
- A complete AK Summary that addresses the following technical requirements:
  - Executive Summary;

- Waste Stream Identification Summary, including a demonstration that the waste stream has been properly delineated and meets the Permit definition of waste stream (Permit Attachment C, Introduction);

- Mandatory Program Information (including, but not limited to, facility location and description, mission, defense waste assessment, spent nuclear fuel and high-level waste assessment, description of waste generating processes, research/development [as necessary], facility support operations [as applicable], types and quantities of TRU waste generated, correlation of waste streams to buildings/processes, waste identification and categorization, physical form identifiers);

- Mandatory Waste Stream Information (including, but not limited to, Area and Building of Generation, waste stream volume/period of generation (including, for newly generated waste, the rate and quantity of waste to be generated), waste generating activities, types of waste generated, material input related to physical form and identification of percentage of each waste material parameter in the waste stream, chemical content information including hazardous constituents and hazardous waste identification, prohibited item content (including documented evidence that the waste meets the TSDF-WAC Permit Sections 2.3.3.1 through 2.3.3.10), waste packaging, presence of filter vents, number of layers of confinement);

- Types of additional information gathered;

- Container specific data (if available and relevant); and

- A complete reference list including all mandatory and additional information.

- An AK roadmap (defined as a cross reference between mandatory programmatic and mandatory waste stream information, with references supporting these requirements).

- A complete reference list including all mandatory and additional documentation.

- Additional relevant information for the required programmatic and waste stream data addressed in the AK Summary, examples of which are presented in Permit Attachment C4, Section C4-2c.

- Identification of any mandatory requirements supported only by upper tier documents (i.e., there is insufficient supporting data).

- Description or other means of demonstrating that the AK process described in the Permit was followed (for example, AK personnel were appropriately trained; discrepancies were documented, etc).

- Information showing that the generator/storage site has developed a written procedure for compiling the AK information and assigning hazardous waste numbers as required in Permit Attachment C4-3b.

- Information showing that the generator/storage site has assessed the AK process (e.g. internal audits, Permit Attachment C4-3b).

The Permittees shall evaluate the Determination Request for completeness and technical adequacy as specified in Permit Attachment C.

C4-3e Requirements for Re-evaluating Acceptable Knowledge Information

Acceptable knowledge includes information regarding the physical form of the waste, the base materials composing the waste, and the process that generates the waste. Waste ~~sampling and analysis~~ testing (i.e., radiography or visual examination~~, headspace gas sampling and analysis, and homogeneous waste sampling and analysis~~) may be used to augment acceptable knowledge information.

The Waste Stream Profile Form (**WSPF**) and Characterization Information Summary (including the acceptable knowledge summary) will be reviewed by the Permittees for each waste stream prior to DOE approval of the WSPF. The Permittees' review will ensure that the submitted AK information was collected under procedures that ensure implementation of the WAP, provides data sufficient to meet the DQOs in Section C-4a(1), and allow the Permittees to demonstrate compliance with the waste analysis requirements of the Permit. A detailed discussion of the Permittees' waste stream review and DOE's WSPF approval process is provided in Section C-1d.

The Permittees shall require sites to establish procedures for reevaluating acceptable knowledge if the results of waste confirmation indicate that the waste to be shipped does not match the approved waste stream, or if data obtained from radiography or visual examination for waste streams without an AK Sufficiency Determination exhibit this discrepancy. Site procedures shall describe how the waste is reassigned, acceptable knowledge reevaluated, and appropriate hazardous waste numbers assigned. If the reevaluation requires that the Waste Matrix Code be changed for the waste stream or the waste does not match the approved waste stream, the following minimum steps shall be taken to reevaluate acceptable knowledge:

- Review existing information based on the container identification number and document all differences in hazardous waste number assignments

- If differences exist in the hazardous waste numbers that were assigned, reassess and document all required acceptable knowledge information (Section C4-3b) associated with the new designation

- Reassess and document all ~~sampling and analytical~~testing data associated with the waste

- Verify and document that the reassigned Waste Matrix Code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination

- Record all changes to acceptable knowledge records

- If discrepancies exist in the acceptable knowledge information for the revised Waste Matrix Code, document the segregation of the affected portion of the waste stream, and define the actions necessary to fully characterize the waste

~~Potential toxicity characteristics for base materials that compose TRU mixed heterogeneous debris (S5000) waste may be determined without destructive sampling and analysis via acceptable knowledge. Sites will assign a Waste Matrix Code and waste stream to each container of waste using acceptable knowledge. Sites shall assign the toxicity characteristic hazardous waste numbers consistent with RCRA requirements. If a toxicity characteristic hazardous constituent is identified during AK, the potential assignment of a hazardous waste number must be evaluated and the results placed in the AK record. Procedures shall describe how additions to hazardous waste numbers based on material composition are documented, as necessary (Section C4-3b).~~

~~The Permittees shall require sites to use acceptable knowledge to identify spent solvents associated with each TRU mixed waste stream or waste stream lot. Headspace gas data will be used to resolve the assignment of EPA F-listed hazardous waste numbers to debris waste streams when waste streams do not have an AK Sufficiency Determination approved by DOE. In this case, sites shall assign F-listed hazardous waste numbers (20.4.1.200 NMAC, incorporating 40 CFR §261.31) by evaluating the average concentrations of each VOC detected in container headspace gas for each waste stream or waste stream lot using the upper 90 percent confidence limit (**$UCL_{90}$**). The $UCL_{90}$ for the mean concentration shall be compared to the program required quantitation limit (**PRQL**) for the constituent. If the $UCL_{90}$ for the mean concentration exceeds the PRQL, sites shall reevaluate their acceptable knowledge information and determine the potential source of the constituent. Sites shall provide documentation to support any determination that F-listed organic constituents are associated with packaging materials, radiolysis, or other uses not consistent with solvent use. If the source of the detected F-listed solvents can not be identified, the appropriate spent solvent hazardous waste number will be conservatively applied to the waste stream. In the case of applicable toxicity characteristic VOCs and non-toxic F003 constituents, generator/storage sites may assess whether the head space gas concentration would render the waste non-hazardous for those characteristics and change the initial acceptable knowledge determination accordingly.~~

~~EPA hazardous waste numbers associated with S3000 and S4000 waste streams will be assigned based on the results of the total/TCLP analysis of a representative homogeneous waste sample when waste streams do not have an AK Sufficiency Determination approved by DOE. As with headspace gas, if the total/TCLP results indicate that the concentration of a characteristic waste or non-toxic constituent of an F003 waste is below regulatory levels, the hazardous waste number assigned initially by acceptable knowledge may be changed. Otherwise, if an F-listed waste constituent is detected, the appropriate hazardous waste number shall be applied.~~

~~If the site determines that the source of the F-listed constituent is a spent solvent used in the process or is determined to be the result of mixing a listed waste with a solid waste during waste packaging, or applicable toxicity characteristic or non-toxic F003 wastes are present in excess of regulatory levels, then the site will either: 1) assign the applicable listed hazardous waste number to the entire waste stream, or 2) segregate the drums containing detectable concentrations of the solvent into a separate waste stream and assign applicable hazardous waste numbers. Each site shall document, justify, and consistently delineate waste streams and assign hazardous waste numbers as required in this permit and must consider all generator-~~

~~specific waste streams and hazardous waste number assignments. The site must also consider site-specific permit requirements and other state-enforced agreements in this analysis.~~

~~To determine the mean concentration of solvent VOCs, all headspace-gas data or homogeneous waste data for a waste stream or waste stream lot (i.e., the portion of the waste stream that is characterized as a unit) will be used, including data qualified with a 'J' flag (i.e., less than the PRQL but greater than the method detection limit [**MDL**]) or qualified with a 'U' flag (i.e., undetected). For data qualified with a 'U' flag, sites shall use one-half the MDL in calculating the mean concentration. Because listed wastes are not defined based on concentration, sites may not remove hazardous waste numbers assigned using acceptable knowledge if hazardous constituents are not detected in the headspace gas or solids/soil analysis.~~

~~TRU mixed headspace gases and homogeneous waste matrices may contain one or two constituents (e.g., carbon tetrachloride and 1,1,1-trichloroethane) at concentrations that are orders of magnitude higher than the other target analytes. In these cases, samples shall be diluted to remain within the instrument calibration range for the elevated constituents. Sample dilution results in elevated MDLs for the constituents with elevated concentrations. Only the concentrations of detected constituents will be used to calculate the mean for the purpose of assigning F-listed hazardous waste numbers. Because the presence or absence of F-listed solvents can not be assigned based on the artificially high MDLs that are caused by sample dilution, data flagged as 'U' and showing an elevated MDL will not be used in calculating the mean concentration.~~

## C4-3f Acceptable Knowledge Data Quality Requirements

The data quality objectives for ~~sampling and analysis~~testing techniques are provided in Permit Attachment C3. ~~Analytical~~ Testing results will be used to augment the characterization of wastes based on acceptable knowledge. To ensure that the acceptable knowledge process is consistently applied, the Permittees shall require sites to comply with the data quality requirements for acceptable knowledge documentation in Permit Attachment C3.

Each site shall address quality control by tracking its performance with regard to the use of acceptable knowledge by: 1) assessing the frequency of inconsistencies among information, and 2) documenting the results of waste discrepancies identified by the generator/storage site during waste characterization or the Permittees during waste confirmation using radiography, review of radiography audio/video recordings, visual examination, or review of visual examination records. In addition, the acceptable knowledge process and waste stream documentation shall be evaluated through internal assessments by generator/storage site quality assurance organizations.

## C4-3g Audits of Acceptable Knowledge

DOE will conduct an initial audit of each site prior to certifying the site for shipment of TRU mixed waste to the WIPP facility. This initial audit will establish an approved baseline that will be reassessed annually DOE. These audits will verify compliance with the requirements specified in the WAP (Permit Attachment C). The audits will be used to verify compliance with the compilation, application, and interpretation requirements of acceptable knowledge information specified in this Permit at all sites, and to evaluate the completeness and defensibility of site-specific acceptable knowledge documentation related to hazardous waste characterization.

Permit Attachment C6 gives a description of the overall audit program and a required checklist. Figure C4-2 includes the primary steps associated with the audit process of acceptable knowledge.

Site-specific audit plans will be prepared by DOE and provided to NMED, and will identify the scope of the audit, requirements to be assessed, participating personnel, activities to be audited, organizations to be notified, applicable documents, and schedule. Audits will be performed in accordance with written procedures and site-specific checklists that will be developed by DOE prior to the audit and provided to NMED. The site-specific audit checklists will include items associated with the compilation and evaluation of the required acceptable knowledge information as specified in the checklist required by Permit Attachment C6.

Audit checklists shall include Table C6-3 in Permit Attachment C6, and will include but not be limited to the following elements for review during the audit:

- Documentation of the process used to compile, evaluate, and record acceptable knowledge is available and implemented;
- Personnel qualifications and training are documented;
- All of the required acceptable knowledge documentation specified in Section C4-2 has been compiled in an auditable record;
- All of the required procedures specified in C4-3 have been developed and implemented, including but not limited to:
  - A procedure exists for assigning hazardous waste numbers to waste streams in accordance with Section C4-3;
  - A procedure exists for resolving discrepancies in acceptable knowledge documentation in accordance with Section C4-3; and
- Results of other audits of the TRU mixed waste characterization programs at the site are available in site records.

Members of the audit team will be knowledgeable regarding the required acceptable knowledge information, RCRA regulations and EPA guidance regarding the use of acceptable knowledge for waste characterization, RCRA hazardous waste characterization, and the WAP requirements (Permit Attachment C). Audit team members will be independent of all TRU mixed waste management operations at the site being audited.

Auditors will evaluate acceptable knowledge documentation for at least one waste stream from the Summary Category Group(s) being audited, and will audit acceptable knowledge traceability for at least one container from the audited Summary Category Group(s). For these waste streams, auditors will review all procedures and associated processes developed by the site for documenting the process of compiling acceptable knowledge documentation; correlating information to specific waste inventories; assigning hazardous waste numbers; and identifying, resolving, and documenting discrepancies in acceptable knowledge records. The adequacy of acceptable knowledge procedures and processes will be assessed and any deficiencies in procedures documented in the audit report.

Auditors will review the acceptable knowledge documentation for selected waste streams for logic, completeness, and defensibility. The criteria that will be used by auditors to evaluate the logic and defensibility of the acceptable knowledge documentation include completeness and traceability of the information, consistency of application of information, clarity of presentation, degree of compliance with this Permit Attachment with regard to acceptable knowledge data, nonconformance procedures, and oversight procedures. Auditors will evaluate compliance with written site procedures for developing the acceptable knowledge record. A completeness review will evaluate the availability of all required TRU mixed waste management program information and TRU mixed waste stream information (Section C4-2). Records will be reviewed for correlation to specific waste streams and the basis for characterizing hazardous waste. Auditors will verify that sites include all required information and assigned appropriate hazardous waste numbers as indicated by the acceptable knowledge records and consistent with RCRA requirements. All deficiencies in the acceptable knowledge documentation will be included in the audit report.

Auditors will verify and document that sites use administrative controls and follow written procedures to characterize hazardous waste for newly-generated and retrievably stored wastes. Procedures to document changes in acceptable knowledge documentation and changes to hazardous waste number assignments to specific waste streams also will be evaluated for compliance with the WAP (Permit Attachment C).

After the audit is complete, DOE will provide the site with preliminary results at a close-out meeting. DOE will prepare a final audit report that includes all observations and findings identified during the audit. Sites shall respond to all audit findings and identify corrective actions. Audit results will be included in the final audit report (Permit Attachment C6). If acceptable knowledge procedures do not exist, the required information is not available, or corrective actions (i.e., CARs) are identified associated with acceptable knowledge compilation, and/or hazardous waste characterization, the Permittees will not manage, store, or dispose TRU mixed waste for the subject waste summary category. Management, storage, or disposal of the subject waste summary category at WIPP will not resume until DOE find that all corrective actions have been implemented and the site complies with all applicable requirements of the WAP.

DOE disseminates information regarding TRU mixed waste characterization requirements and program status through the WIPP Home Page. The Permittees will use this web page to disseminate information regarding TRU mixed waste streams, RCRA compliance, and operational and programmatic issues, methods development, and waste characterization information, including the application of acceptable knowledge. DOE is provided the required waste characterization information prior to management, storage, or disposal of that waste at WIPP and also will conduct audits at least annually. The Permittees will maintain an operating record for review during regulatory agency audits. NMED may also review any information relevant to the scope of the audit during site audits. DOE will notify NMED regarding any site's failure to implement corrective actions associated with hazardous waste characterization as specified in Parts 1 and 2 and Permit Attachment C3.

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# FIGURES

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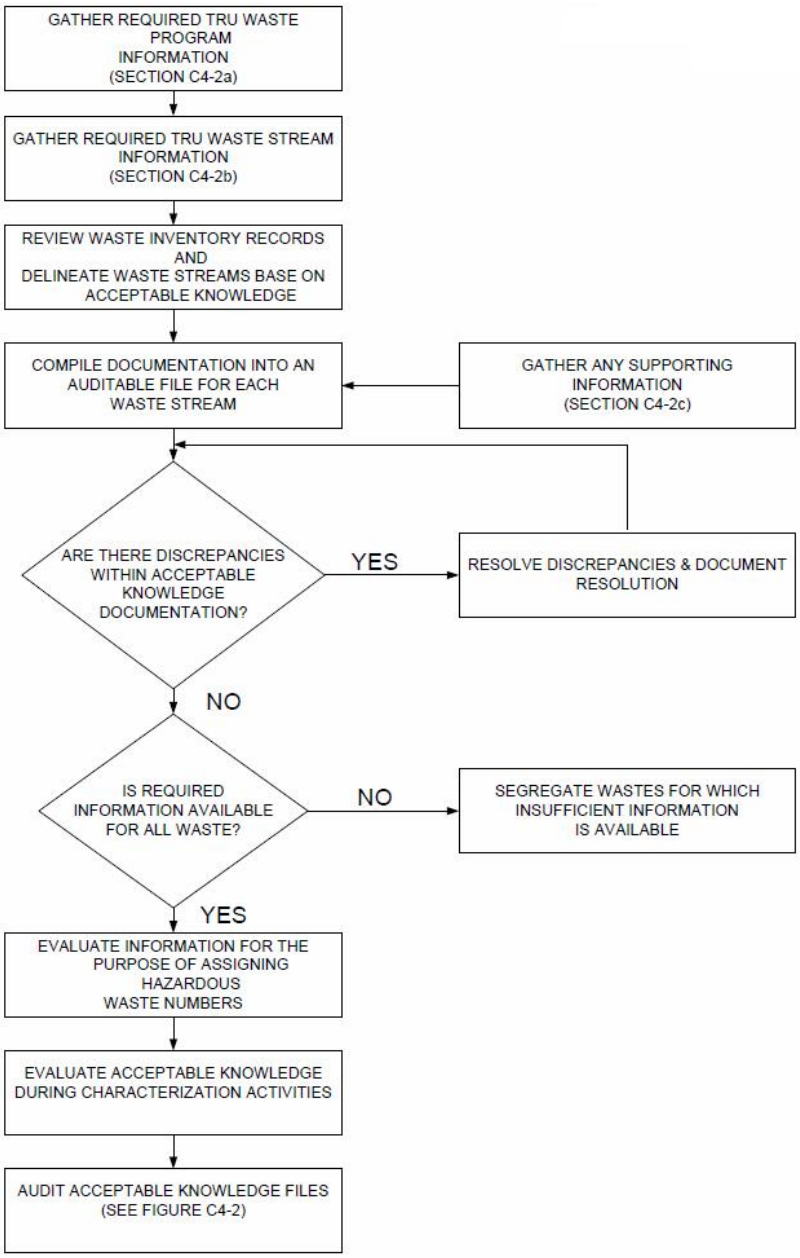
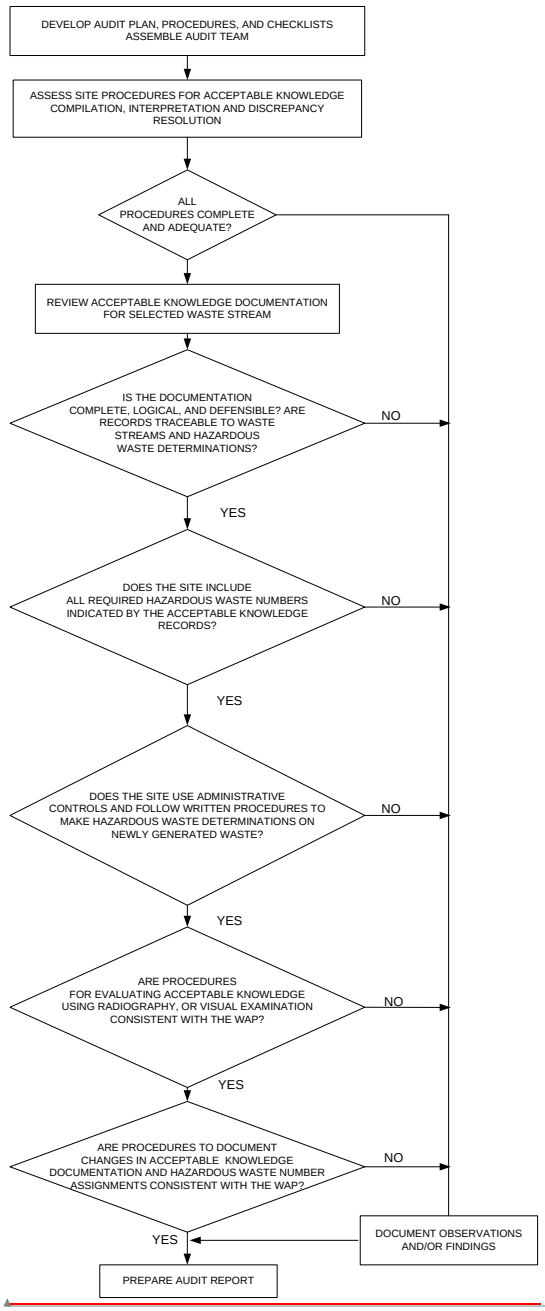



**Figure C4-1**
**Compilation of Acceptable Knowledge Documentation**




Field Code Changed

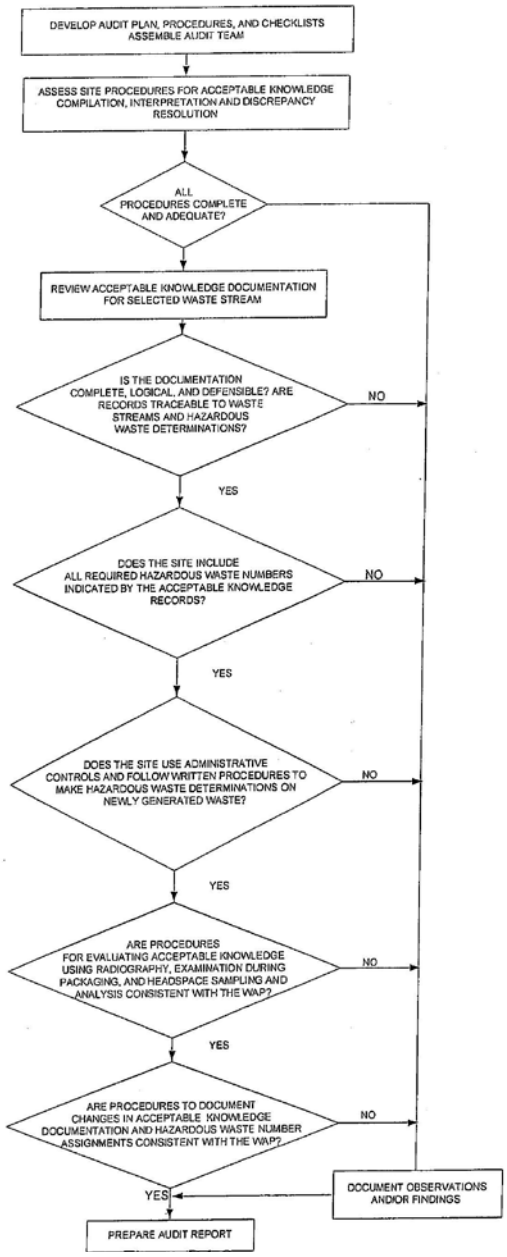



**Figure C4-2**
**Acceptable Knowledge Auditing**

# ATTACHMENT C5

# QUALITY ASSURANCE PROJECT PLAN REQUIREMENTS

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# ATTACHMENT C5

# QUALITY ASSURANCE PROJECT PLAN REQUIREMENTS

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# ATTACHMENT C5

# QUALITY ASSURANCE PROJECT PLAN REQUIREMENTS

## C5-1 Quality Assurance Project Plans

Prior to management, storage, or disposal of a generator/storage site's TRU mixed waste at WIPP, the Permittees shall require that each participating site develops and implements a quality assurance project plan (**QAPjP**) that addresses all the applicable requirements specified in Waste Isolation Pilot Plant waste analysis plan (**WAP**) in Permit Attachment C. The U.S. Department of Energy (**DOE**) will approve QAPjPs from all generator/storage sites that intend to send TRU mixed waste to the Waste Isolation Pilot Plant. DOE shall ensure that these QAPjPs include the qualitative or quantitative criteria for determining whether waste characterization program activities are being satisfactorily performed. DOE shall also ensure that QAPjPs identify the organization(s) and position(s) responsible for their implementation. Additionally, the QAPjPs shall also reference site-specific documentation that details how each of the required elements of the characterization program will be performed.

DOE shall ensure that prior to the implementation of characterization activities at participating sites, standard operating procedures (**SOPs**) were developed for all activities which affect the quality of the waste characterization program elements specified in the WAP. For the purposes of the quality assurance program, the term SOP refers to any site-specific implementing document. Compliance with SOPs will ensure that tasks are performed in a consistent manner that results in achieving the quality required for the quality assurance program. The organization, format, content, and designation of SOPs shall be described in the QAPjPs. Site-specific SOPs will be reviewed for consistency with the QAPjP according to the Audit and Surveillance Program specified in Permit Attachment C6.

## C5-2 Document Review, Approval, and Control

DOE shall ensure that the preparation, issuance, and change to documents that specify quality requirements or prescribe activities affecting quality for the transuranic mixed waste characterization program elements specified in the WAP be controlled to assure that correct and current documents are used and referenced. The QAPjPs shall include a document control format consisting of a unique document identification number, current revision number, date, and page number which will be placed on the individual pages of the document. All quality documents for the waste characterization program shall be reviewed prior to approval and issuance by qualified and independent individuals. The QAPjP review shall consider the technical adequacy, completeness, and correctness of the QAPjP, and the inclusion of and compliance with the requirements established by the WAP (Permit Attachment C). DOE shall ensure that appropriate QAPjP approval is indicated by a signature and date page included in the front of each document.

At a minimum, DOE shall ensure that revisions to documents that implement the requirements of the WAP are denoted by including the current revision number on the document title page, the revised signature page, and each page that has been revised. Only revised pages need to be reissued. Changes to documents, other than those defined as editorial changes or minor changes, shall be reviewed and approved by the same functional organizations that performed the original review and approval, unless other organizations are specifically designated in

accordance with approved procedures. Editorial or minor changes may be made without the same level of review and approval as the original or otherwise changed document. The following items are considered editorial or minor changes:

- Correcting grammar or spelling (the meaning has not changed)
- Renumbering sections or attachments
- Updating organizational titles
- Changes to nonquality-affecting schedules
- Revised or reformatted forms, providing the original intent of the form has not been altered
- Attachments marked “Example,” “Sample,” or exhibits that are clearly intended to be representative only

A change in an organizational title accompanied by a change in the responsibilities is not considered an editorial change. Changes to the text shall be clearly indicated in the document. DOE shall provide the QAPjP for each site and all revisions to NMED upon approval by DOE.

DOE shall ensure that QAPjPs include a detailed description of the reporting and approval requirements for changes to approved QA documents and SOPs, including procedures for implementing changes to these documents. All members of the site project staff are responsible for reporting any obsolete or superseded information to the site project manager. All site-specific changes shall be evaluated and approved by the site project manager before implementation. The site project manager shall notify the appropriate personnel and the affected documents shall be revised as necessary. The site project manager shall also be responsible for notifying the DOE field office of the changes. DOE shall ensure that changes that affect performance criteria or data quality, testing procedures, quality assurance objectives, calibration requirements, or QC sample acceptance criteria comply with the WAP (Permit Attachment C) and shall not be made without prior approval of DOE.

# ATTACHMENT C5

# QUALITY ASSURANCE PROJECT PLAN REQUIREMENTS

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# ATTACHMENT C5

# QUALITY ASSURANCE PROJECT PLAN REQUIREMENTS

## C5-1 Quality Assurance Project Plans

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DOE shall ensure that prior to the implementation of characterization activities at participating sites, standard operating procedures (**SOPs**) were developed for all activities which affect the quality of the waste characterization program elements specified in the WAP. For the purposes of the quality assurance program, the term SOP refers to any site-specific implementing document. Compliance with SOPs will ensure that tasks are performed in a consistent manner that results in achieving the quality required for the quality assurance program. The organization, format, content, and designation of SOPs shall be described in the QAPjPs. Site-specific SOPs will be reviewed for consistency with the QAPjP according to the Audit and Surveillance Program specified in Permit Attachment C6.

## C5-2 Document Review, Approval, and Control

DOE shall ensure that the preparation, issuance, and change to documents that specify quality requirements or prescribe activities affecting quality for the transuranic mixed waste characterization program elements specified in the WAP be controlled to assure that correct and current documents are used and referenced. The QAPjPs shall include a document control format consisting of a unique document identification number, current revision number, date, and page number which will be placed on the individual pages of the document. All quality documents for the waste characterization program shall be reviewed prior to approval and issuance by qualified and independent individuals. The QAPjP review shall consider the technical adequacy, completeness, and correctness of the QAPjP, and the inclusion of and compliance with the requirements established by the WAP (Permit Attachment C). DOE shall ensure that appropriate QAPjP approval is indicated by a signature and date page included in the front of each document.

At a minimum, DOE shall ensure that revisions to documents that implement the requirements of the WAP are denoted by including the current revision number on the document title page, the revised signature page, and each page that has been revised. Only revised pages need to be reissued. Changes to documents, other than those defined as editorial changes or minor changes, shall be reviewed and approved by the same functional organizations that performed the original review and approval, unless other organizations are specifically designated in

accordance with approved procedures. Editorial or minor changes may be made without the same level of review and approval as the original or otherwise changed document. The following items are considered editorial or minor changes:

- Correcting grammar or spelling (the meaning has not changed)
- Renumbering sections or attachments
- Updating organizational titles
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- Attachments marked “Example,” “Sample,” or exhibits that are clearly intended to be representative only

A change in an organizational title accompanied by a change in the responsibilities is not considered an editorial change. Changes to the text shall be clearly indicated in the document. DOE shall provide the QAPjP for each site and all revisions to NMED upon approval by DOE.

DOE shall ensure that QAPjPs include a detailed description of the reporting and approval requirements for changes to approved QA documents and SOPs, including procedures for implementing changes to these documents. All members of the site project staff are responsible for reporting any obsolete or superseded information to the site project manager. All site-specific changes shall be evaluated and approved by the site project manager before implementation. The site project manager shall notify the appropriate personnel and the affected documents shall be revised as necessary. The site project manager shall also be responsible for notifying the DOE field office of the changes. DOE shall ensure that changes that affect performance criteria or data quality, ~~such as sample handling and custody requirements, sampling and analytical~~ testing procedures, quality assurance objectives, calibration requirements, or QC sample acceptance criteria comply with the WAP (Permit Attachment C) and shall not be made without prior approval of DOE.

# ATTACHMENT C6

# AUDIT AND SURVEILLANCE PROGRAM

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# ATTACHMENT C6

# AUDIT AND SURVEILLANCE PROGRAM

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# ATTACHMENT C6

# AUDIT AND SURVEILLANCE PROGRAM

## C6-1 Introduction

The Waste Isolation Pilot Plant (**WIPP**) Audit and Surveillance Program shall ensure that: 1) the operators of each generator/storage site (**site**) that plan to transport transuranic (**TRU**) mixed waste to the WIPP facility conduct testing of wastes in accordance with the current WIPP Waste Analysis Plan (**WAP**) (Permit Attachment C), and 2) the information supplied by each site to satisfy the waste screening and acceptability requirements of Section C-4 of the WAP is being managed properly. DOE will conduct these audits and surveillances at each site performing these activities in accordance with a standard operating procedure (**SOP**). NMED personnel may observe these audits and surveillances to validate the implementation of WAP requirements (Permit Attachment C) at each site. Only personnel with appropriate U.S. Department of Energy clearances will have access to classified information during audits. Classified information will not be included in audit reports and records. The audit SOP will contain steps for selecting audit personnel, reviewing applicable background information, preparing an audit plan, preparing audit checklists, conducting the audit, developing an audit report, and following up audit deficiencies. A deficiency is any failure to comply with an applicable provision of the WAP. The checklists for each site shall include, at a minimum, the appropriate checklists found in Tables C6-1 through C6-4 for the summary category groups undergoing audit.

## C6-2 Audit Procedures

Audit procedures shall establish the responsibilities and methodology for planning, scheduling, performing, reporting, verifying, and closing announced and unannounced audits of sites. Records of all audit activities shall be part of the WIPP Operating Record and maintained at the WIPP facility until closure. NMED shall be provided unlimited access to these records.

Approved procedures shall be used to describe audit activities and requirements. Procedures define the responsibilities of specific positions necessary to manage this audit program. The DOE manager who oversees the audit program shall ensure that the following tasks are performed:

- Schedule audits
- Designate lead auditor(s)
- Appoint auditor and lead auditor trainees
- Maintain auditor training and qualification records
- Assure that all auditors have been given appropriate training, including training on the WAP
- Assign auditors and lead auditors to perform annual certification audits

- Review and approve final audit reports
- Oversee tracking and closure of all deficiencies and any observations requiring action
- Assure records are entered into the WIPP Operating Record and are properly maintained until facility closure

C6-3 Audit Position Functions

DOE will approve lead auditors, auditors, and technical specialists based upon the expertise required for the functions being examined according to the audit scope. DOE will supply auditors/technical specialists with expertise in the Resource Conservation and Recovery Act (**RCRA**) requirements and knowledge of the testing and documentation methods required to verify the hazardous waste characterization performed by the sites. DOE shall identify all audit team members to NMED prior to the audit, and shall provide upon request the qualifications of all audit team members.

The lead auditor assigned to be the audit team leader must perform the following tasks:

- Concur that assigned auditors and technical specialists have the collective experience and training commensurate with the scope, complexity, or special nature of the activities to be audited
- Develop an audit plan and coordinate the preparation of an overall checklist to cover the scope of the audit, with consideration given to all nonconformances reported as specified in Permit Attachment C3 and to previous audit results from that site
- Assign specific audit areas to individual auditors and technical specialists within their particular specialty and provide guidance on checklist development
- Review individual auditor checklists to assure complete coverage of assigned scope, and approve the checklists
- Conduct the audit at the site
- Encourage observers to participate according to the protocol established by DOE
- Communicate audit results at the conclusion of the audit, including any deficiencies and observations
- Prepare and sign the audit report
- Maintain complete records of each audit and transfer them to the manager when the audit report is issued

Auditors and technical specialists assigned to the specific audit will report to the audit team leader for supervision and may perform the following tasks:

- Attend any required specific training and team orientation and planning meetings as directed by the audit team leader
- Prepare specific audit checklists to verify that the WAP Quality Assurance Objectives (**QAO**) are met for the areas being audited
- Obtain audit team leader approval of checklist
- Review acceptable knowledge documentation packages, test report data, and documentation of data verification activities
- Obtain and evaluate objective evidence by means of observation, document reviews, or the conduct of interviews with operators, technicians, and others necessary to determine the adequacy and effective implementation of the WAP
- Conduct inspection tours of waste generating stations, waste testing facilities, calibration facilities, administrative, and document control/record facility
- Complete checklist during the audit indicating the objective evidence observed verifies that the site has met the QAOs for the program elements, methods, and the activities being audited. Add other items to the checklist as they are observed or as needed during the audit
- Prepare narrative statements for all deficiencies, and observations that clearly and concisely identify the conditions involved
- Prepare any portion of the final audit report assigned by the lead auditor.

Audits will be conducted at least annually for each site involved in the waste characterization program. Both announced and unannounced audits will address the following:

- Results of previous audits
- Changes in programs or operations
- New programs or activities being implemented
- Changes in key personnel

Annual certification audits shall address contact-handled (**CH**) and remote-handled (**RH**) waste characterization activities if the site has approval or is seeking approval for such wastes. At a minimum, the audit shall evaluate acceptable knowledge documentation for CH and RH waste separately by Summary Category Group, as applicable.

## C6-4 Audit Conduct

The conduct of the audit shall commence with an entrance meeting, conducted by the audit team leader, with site management. At this meeting, the audit objectives and scope, the specific areas to be audited, the processes or functions to be observed, and the site participation required, including site interfaces, will be identified. The purpose of this meeting is to confirm the audit scope, discuss the audit sequence, establish channels of communication, and confirm the daily and exit meeting. Audits shall be performed using approved audit checklists that include

the checklists in Tables C6-1 to C6-4 for the summary category groups undergoing audit. Consistency of evaluation shall be ensured before the audit through site QAPjP approval (see Permit Attachment C5). QAPjPs for each site shall incorporate the same requirements from the WAP. Objective evidence shall be examined (to the depth necessary) to determine if the identified activities, procedures, or QAOs are adequate and are being effectively implemented.

Audits may not include all waste summary category groups, and thus some audit checklists or portions of checklists (Tables C6-1 through C6-4) may not be applicable to some sites (e.g., approved acceptable knowledge sufficiency determination request for one or more waste streams at a site). In these instances, DOE shall indicate nonapplicability in the appropriate checklist row, and justify the exclusion under the “Comment” column. In addition, in cases where discrepancies exist between the audit checklists in Tables C6-1 through C6-4 and the Permit, Permit requirements take precedence. DOE may add to the checklists as necessary to clarify Permit requirements, but any additions will be clearly designated on the checklists (i.e., redline the additions).

Audits shall include site personnel interviews, document and record reviews, observations of operations, and any other activities deemed necessary by the auditors to meet the objectives of the audit. Observations or deficiencies identified during the audit will be investigated or evaluated, as necessary, to determine if they are isolated conditions or represent a general breakdown of the waste characterization quality assurance program. During audit interviews or audit meetings, site personnel may be advised of deficiencies identified within their areas of responsibility to establish a clear understanding of the identified condition.

The site personnel will be given the opportunity to correct any deficiency that can be corrected during the audit period. Deficiencies and observations will be documented and included as part of the final audit report. Those items that have been resolved during the audit (isolated deficiencies that do not require a root cause determination or actions to preclude recurrence), will be verified prior to the end of the audit, and the resolution will be described in the audit report. Those items that affect the quality of the program, and/or the data generated by that program, which are required by the WAP will be documented on a Corrective Action Report (**CAR**) and included as a part of the final audit report. The CAR will be entered into DOE’s CAR tracking system and tracked until closure. RCRA-related items will be uniquely identified within the CAR tracking system so that they can be tracked separately. RCRA-related CARs identified by the site during self-audits will be evaluated during DOE’s audit and surveillance program and tracked in DOE’s tracking systems.

When a deficiency is identified by the audit team, the audit team member who identified the deficiency prepares the CAR. DOE reviews the CAR, determine validity (assures that a requirement has in fact been violated), classify the significance of the deficiency, assign a response due date, and issue the CAR to the site. The site reviews the CAR, evaluates the extent and cause of the deficiency, and provides a response to DOE indicating the remedial actions and actions taken to preclude recurrence. DOE reviews the response from the site and, if acceptable, communicate the acceptance to the site. The site completes remedial actions and actions to preclude recurrence. After all corrective actions have been completed, DOE may schedule and perform a verification visit to assure that corrective actions have been completed and are effective. NMED personnel may participate as observers in these verification visits. When all actions have been completed and verified as being effective, the CAR is closed by the DOE manager responsible for quality assurance. As part of the planning process for subsequent

audits and surveillances, past deficiencies will be reviewed and the previous deficient activity or process is subject to reassessment.

NMED may submit a written Observer Inquiry to DOE if necessary to seek resolution to a question raised or issue posed during the audit. DOE shall be responsible for obtaining a response to the Observer Inquiry and submitting a written response to NMED within 30 days of inquiry submission. NMED will examine the response and consider this information as part of the audit review and approval process.

The sites shall submit corrective action plans to eliminate the deficiency stated on the CAR, including a resolution of the acceptability of any data generated prior to the resolution of the corrective action.

The corrective action response will include a discussion of the investigation performed to determine the extent and impact of the deficiency, a description of the remedial actions taken, determination of root cause, and actions to preclude recurrence.

An exit meeting will be conducted by the lead auditor prior to departure of the audit team from the site. This meeting will include site management personnel, and may include DOE field office personnel. All draft audit results will be presented to the site management.

The audit report will be prepared, approved, and issued to the site within 30 days of the completion of the audit by DOE. NMED shall receive a copy of the audit report upon issuance for information purposes. A formal final audit report will be provided to NMED which will include WAP-related CAR resolution results and audit results that will include, as a minimum, sections describing the scope, purpose, summary of deficiencies, and observations in narrative format, completed audit checklists, audited procedures, and other applicable documents which provide evidence of WAP implementation. The report will also include an identification of the organization audited, the dates of the audit, and the requested response date. NMED will make the final audit report available for public review and comment. One copy of the formal final audit report shall be submitted to NMED in hard copy, but any additional copies may be submitted in electronic format. The audited site will respond to any deficiencies and observations within (30 days after receipt of any CARs and indicate the corrective action taken or to be taken. If the corrective action has not been completed, the response must indicate the expected date the action will be completed. CARs applicable to WAP requirements shall be resolved prior to waste shipment. Subsequent audits or specific verifications, announced or unannounced, will determine if the corrective action has been satisfactorily implemented. Deficiencies (items corrected during the audit [**CDAs**] and CARs) and observations will be tracked to completion according to established procedure(s). In addition, deficiencies will be trended to determine if similar situations exist system wide. Trend reports will be issued as necessary to provide a “lessons learned” announcement to other sites who might benefit from program improvements implemented as a result of resolutions to the specific situations discovered at the performance of these audits.

The final audit report provided to NMED and audit records will be maintained at WIPP as a part of the Operating Record. These records will be included on the Record Inventory and Disposition Schedule and maintained on-site until closure of the WIPP facility. NMED shall be provided unlimited access to these records.

# TABLES

## Table C6-1 Waste Analysis Plan (WAP) General Checklist for use at DOE'S Generator/Storage Sites

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Waste Stream Identification** | | | | | |
| 1 | Does the generator/storage site define "waste stream" as waste materials that have common physical form, that contain similar hazardous constituents, and that are generated from a single process or activity? (Attachment C Section C-0a) | | | | | |
| 2 | Are procedures in place to ensure that the generator/storage site assigns one of the Summary Category Groups (S3000-homogeneous solids, S4000-soils/gravel, S5000-debris waste) to each waste stream? (Section C-1b) | | | | | |
| 3 | Are procedures in place to ensure that the generator/storage site assigns Waste Matrix Code Groups (e.g., solidified inorganics, solidified organics, salt waste, soils, combustible waste, filters, graphite, heterogeneous debris waste, inorganic nonmetal waste, lead/cadmium metal, uncategorized metal) to each waste stream? (Section C-0a) | | | | | |
| 4 | Are procedures in place to ensure that the generator/storage site assigns a Waste Stream WIPP Identifier (ID) to each waste stream? (Section C3-6b(1)) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 4a | Are procedures in place for generator/storage sites to submit an AK Sufficiency Determination (Determination Request) to the Permittees to meet all or part of the waste characterization requirements including:<br>• All information specified in Permit Attachment C4, Section C4-3d<br>• Identification of relevant hazardous constituents, and correctly identifies all toxicity characteristic and listed hazardous waste numbers<br>• All hazardous waste number assignments must be substantiated by supporting data and, if not, whether this lack of substantiation compromises the interpretation<br>• Resolution of data discrepancies between different AK sources must be technically correct and documented<br>• The AK Summary includes all the identification of waste material parameter weights by percentage of the material in the waste stream, and determinations are technically correct<br>• All prohibited items specified in the TSDF-WAC should be addressed, and conclusions drawn are technically adequate and substantiated by supporting information<br>• 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.<br>• The site must provide the supporting information necessary to substantiate technical conclusions within the Determination Request, and this information must be correctly interpreted.<br>(Section C-0b, Section C4-3d) | | | | | |
| 4b | If a generator/storage site does not submit a Determination Request or if the Determination Request is not approved, are procedures in place for the generator/storage site to perform radiography or VE on 100% of the containers in a waste stream as specified in Permit Attachment C1?<br>(Section C-0b) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 4c | Are procedures in place to ensure that the generator/storage sites complete a Waste Stream Profile Form (WSPF) and Characterization Information Summary (CIS) as specified in Permit Attachment C3, Sections C3-6b(1) and C3-6b(2)?<br>(Section C-0c) | | | | | |
| 6 | Are procedures in place to ensure that the generator/storage site assigns EPA hazardous waste numbers associated with the waste? If so, do these assigned EPA hazardous waste numbers correspond to the permitted EPA hazardous waste numbers in Table C-5? Are there any assigned EPA hazardous waste numbers that are not permitted EPA hazardous waste numbers on the Table C-5? If so, did the generator/storage site reject the waste for shipment to and disposal at WIPP? Did the generator assign a state hazardous waste codes or numbers? If so, is it assigned to waste that is permitted at WIPP? (Section C-1b) | | | | | |
| 7 | Are procedures in place to ensure that Summary Category Groups are defined as follows:<br>S3000- Homogeneous solids are solid material, inorganic process residues, inorganic sludges, salt waste, and pyrochemical salt waste excluding soils, that do not meet NMED criteria for classification as debris and are at least 50 percent by volume homogeneous solids or comprise the majority of the waste stream<br>S4000- Waste streams that are at least 50 percent by volume soil/gravel, or comprise the majority of the waste stream<br>S5000- Waste streams that are at least 50 percent volume materials that meet the NMED criteria for debris, or comprise the majority matrix of materials. The criteria for debris are solid materials intended for disposal that exceed 2.36 inch particle size and is a manufactured object, plant or animal matter, or 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.<br>(Section C-0a) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 8 | Does the generator/storage facility have procedures in place to ensure that the following waste characterization parameters will be obtained :<br>• Determination whether TRU mixed waste streams comply with the applicable provisions of the TSDF-WAC<br>• Determination whether TRU mixed wastes exhibit a hazardous characteristic per 20.4.1.200 NMAC (incorporating 40 CFR 261 Subpart C)<br>• Determination whether TRU mixed wastes are listed per 20.4.1.200 NMAC (incorporating 40 CFR 261 Subpart D)<br>• Estimation of waste material parameter weights<br>(Section C-2) | | | | | |
| 9 | Are procedures in place to ensure that waste streams identified to contain incompatible materials or materials incompatible with waste containers cannot be shipped unless treated to remove the incompatibility? (Section C-1c) | | | | | |
| 10 | Are procedures in place to ensure that the generator/storage site uses acceptable knowledge and, as necessary, radiography and visual examination analysis as specified in Table C-1?<br>(Section C-3) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Unacceptable Waste** | | | | | |
| 12 | Are procedures in place to ensure that the generator/storage site ensures, through administrative and operational procedures and characterization techniques, that waste containers do not include the following unacceptable waste:<br>• liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable<br>  • Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination<br>  • Internal containers with more than 60 milliliters or 3 percent by volume observable liquid, whichever is greater, are prohibited<br>  • Containers with Hazardous Waste Number U134 assigned shall have no observable liquid<br>  • 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<br>• non-radionuclide pyrophoric materials<br>• hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes)<br>• wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes<br>• wastes containing explosives or compressed gases (continued below) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 12a | • wastes with polychlorinated biphenyls (PCBs) not authorized under an EPA PCB waste disposal authorization<br>• wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)<br>• 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<br>• 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 wastes stream in each shipment pursuant to Permit Attachment C7<br>• any waste container from a waste stream which has not been preceded by an appropriate, certified Waste Stream Profile Form (see Section C-1d)<br>(Section C-1c) | | | | | |
| | **Waste Acceptance Control** | | | | | |
| 14 | Are procedures in place to ensure that the generator/storage site uses a Waste Stream Profile Form (WSPF) which includes, at a minimum, the information indicated on the attached WSPF found in Figure C-1 and a Characterization Information Summary (CIS) prior to waste disposal at the WIPP? (Section C-1d) | | | | | |
| 16 | Are procedures in place to ensure that additional WSPFs are provided to WIPP and NMED for waste streams or portions of waste streams that are reclassified based upon waste characterization information? (Section C-1d) | | | | | |
| 16a | Are criteria in place to determine the specific circumstances under which a WSPF is revised versus when a new WSPF is required? (Section C-1d) | | | | | |
| | **General Characterization Requirements** | | | | | |
| 25 | Are procedures in place to ensure that Acceptable Knowledge is used in waste characterization activities to delineate TRU mixed waste streams, to assess whether TRU mixed wastes comply with the TSDF-WAC, to assess whether TRU mixed waste exhibits a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR 261 Subpart C), and to assess whether TRU wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR 261 Subpart D), and to estimate waste material parameter weights? (Section C-3a) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 26 | Are procedures in place to ensure that radiography and/or visual examination are used as necessary to:<br>• Examine a waste container to determine the physical form<br>• Identify observable liquid in excess of TSDF-WAC limits and containerized gases<br>• Verify the physical form matches the waste stream description<br>(Section C-3b) | | | | | |
| 28 | Are procedures in place to ensure that the following characterization activities shall occur:<br>• Acceptable Knowledge for all wastes, with testing as necessary to augment AK including;<br>- Visual examination or radiography for all waste containers | | | | | |
| | **Data Generation, Verification, Validation, Documentation, and Quality Assurance** | | | | | |
| 30 | Are procedures in place to ensure that the following Data Quality Objectives are met:<br>• Use Acceptable Knowledge to delineate TRU mixed waste streams, assess whether TRU mixed wastes comply with the applicable requirements of the TSDF-WAC, assess whether TRU mixed wastes exhibit a hazardous characteristic, assess whether TRU mixed wastes are listed and to estimate waste material parameter weights<br>• Use radiography or visual examination to verify the physical form of the waste matches its waste stream description as determined by AK and to verify the absence of prohibited items<br>(Section C-4a(1)) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 31 | Are procedures in place to ensure that the following Quality Assurance Objectives are adequately defined and assessed for each characterization method:<br>• Precision as a measure of the mutual agreement among multiple measurements.<br>• Accuracy as the degree of agreement between a measurement result and a true or known value.<br>• 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.<br>• Comparability is the degree to which one data set can be compared to another data set.<br>• Representativeness as an expression of the degree to which data represent characteristics of a population.<br>(Section C-4a(2)) | | | | | |
| 32 | With respect to data generation, are procedures in place to ensure that the generator/storage site's waste characterization program meets the following general requirements:<br>• Testing data packages and batch data reports must be reported accurately in a pre-approved format, must be maintained in permanent files, and must be traceable?<br>• All data must receive a technical review by another qualified operator?<br>(Section C3-4a) | | | | | |
| 33 | Are procedures in place to ensure that the generator/storage site performs validation of waste characterization data for each waste container? (Section C-4) | | | | | |
| 34 | Are procedures in place to ensure that the generator/storage site has a pre-approved format for reporting waste characterization data? (Section C-4a(3)) | | | | | |
| 35 | Are procedures in place to ensure that the generator/storage site prepares testing batch data reports to meet the requirements of their own site-specific QAPjP and/or SOPs? (Section C-4a(3)) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 36 | Are procedures in place to ensure that all raw data is collected and managed at the data generation level in accordance with the following criteria:<br>• All raw data shall be signed and dated in reproducible ink by the individual collecting the data, or signed and dated using electronic signatures<br>• All data shall be recorded clearly, legibly, and accurately in field records<br>• All changes to original data shall be lined out, initialed, and dated by the individual making the change. Original data may not be obliterated or otherwise be made unreadable<br>• All data shall be transferred and reduced from field records completely and accurately<br>• All field records shall be maintained as specified in Table C- 2 of Attachment C<br>• Data shall be organized into standard reporting formats for reporting purposes.<br>• All electronic and video data must be stored to ensure that waste container and QC data are readily retrievable<br>(Section C3-4a) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 37 | Are procedures in place to ensure that 100 % of batch data reports are subject to independent technical review by an individual qualified to review the data who was not involved in the generation or recording of the data under review. The reviewer shall release the data through signature with an associated review checklist prior to characterization of the associated waste and shipment to the WIPP. The review shall ensure the following, as applicable:<br>• Data generation and reduction were conducted according to the methods used and reported in the proper units and significant figures<br>• Calculations have been verified by a valid calculation program, a spot check of verified calculation programs, and/or a 100 percent check of all hand calculations<br>• The data have been reviewed for transcription errors<br>• The testing QA documentation for BDRs is complete and includes, as applicable, raw data, calculation records, calibration records<br>• Radiography tapes are reviewed on a waste container basis at a minimum of once per testing batch or once per day of operation, whichever is less frequent. The radiography tape will be reviewed against the data on the radiography form to ensure that data are complete and correct<br>• QAOs have been met<br>(Section C3-4a(1)) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 40 | Are procedures in place to ensure that 100 percent of all batch data reports receive a Site Project Manager signature release with an associated review checklist prior to characterization of the associated waste and shipment to the WIPP. This release shall ensure the following:<br>• Testing batch QC checks were properly performed. Radiography data are complete and acceptable based on evidence of videotape review of one waste container per day or once per testing batch, whichever is less frequent<br>• Data generation level independent technical review, validation, and verification have been performed as evidenced by the completed review checklists and appropriate signature releases.<br>• Independent technical reviewers were not involved in the generation or recording of the data under review.<br>• Batch Data review checklists are complete<br>• Batch Data Reports are complete and data properly reported<br>• Verify that data are within established data assessment criteria and meet all applicable QAOs<br>(Section C3-4b(1)) | | | | | |
| 42 | Are procedures in place to ensure that a repeat of the data review process at the data generation level will be performed on a minimum of one randomly chosen waste container every quarter to determine if the verification and validation is performed according to documented procedures? (Section C3-4b) | | | | | |
| 43 | Are procedures in place and checklists are available to prepare a Site Project Manager (SPM) Summary and a Data Validation Summary (the summaries may be in the same document)? The SPM Summary includes a validation checklist for each batch that is of sufficient detail to document all aspects of a batch data report that could affect data quality. The Data Validation Summary must identify each Batch Data Report reviewed , describe how the validation was performed, identify all problems, and identify all acceptable and unacceptable data. Summaries must include release signatures. (Section C3-4b(2)) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 44 | Are procedures in place to ensure that non-administrative, WAP-related nonconformances first identified at the site project manager level are reported to the Permittees within seven calendar days of identification, that nonconformance reports are prepared within 30 calendar days, and that corrective action is implemented prior to waste shipment? (Section C3-7) | | | | | |
| 45 | Are procedures in place to ensure that any waste container for which a nonconformance report (**NCR**) has been written will not be shipped to the WIPP facility unless the condition that led to the NCR for that container is appropriately identified, reconciled, corrected, and documented? Are nonconformance reports prepared for nonconformances identified? Are nonconformances identified and tracked, and does the Site Project Manager oversee the nonconformance report process? (Section C3-7) | | | | | |
| | **Data Transmittal** | | | | | |
| 48 | Are procedures in place to ensure that the generator/storage site transmits data by hard copy or electronic copy from the data generation level to the site project level? If electronic, does the generator/site have a hard copy available on demand? (Section C-4a(5)) | | | | | |
| 50 | Are procedures in place to ensure that the generator/storage site inputs the data into the WWIS manually or electronically? (Section C-4a(5)) | | | | | |
| 51 | Are procedures in place to ensure that the generator/storage site enters the data into the WWIS in the exact format required by the database? (Section C-4a(5)) | | | | | |
| 52 | Are procedures in place to ensure all of the data presented on Table C-3 of the Permit is transmitted to the WWIS? (Table C-3) | | | | | |
| | **Records and Record Management** | | | | | |
| 55 | Are procedures in place to ensure that the generator/storage site's hard copy and/or electronic data reports follow the Permittees' format requirements? (Section C-4a(3)) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 56 | Are procedures in place to ensure that hard copy or electronic Waste Stream Profile Form will include the following<br>• Generator/storage site name<br>• Generator/storage site EPA ID<br>• Date of audit report approval by NMED (if obtained)<br>• Original generator of waste stream<br>• Whether waste is Contact-Handled or Remote-Handled<br>• Waste Stream WIPP Identification Number<br>• Summary Category Group<br>• Waste Matrix Code Group<br>• Waste Material Parameter Weight Estimates per unit of waste<br>• Waste stream name<br>• A description of the waste stream<br>• Applicable EPA hazardous waste numbers<br>• Applicable TRUCON codes<br>• A listing of acceptable knowledge documentation used to identify the waste stream<br>• The waste characterization procedures used and the reference and date of the procedure<br>• Certification signature of Site Project Manager, name, title, and date signed<br>(Section C3-6b(1)) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 56a | Are procedures in place to ensure that hard copy or electronic Characterization Information Summary will include the following:<br>• Data reconciliation with DQOs<br>• Radiography and visual examination summary to document that all prohibited items are absent in the waste and to verify that the physical form of the waste matches its waste stream description as determined by AK (if applicable).<br>• A complete listing of all container identification numbers used to generate the Waste Stream Profile Form, cross-referenced to each Batch Data Report<br>• Complete AK summary, including stream name and number, point of generation, waste stream volume (current and projected), generation dates, TRUCON codes, Summary Category Group, Waste Matrix Code(s) and Waste Matrix Code Group, other TWBIR information, waste stream description, areas of operation, generating processes, RCRA determinations, radionuclide information, all references used to generate the AK summary, and any other information required by Permit Attachment C4, Section C4-2b.<br>• Method for determining Waste Material Parameter Weights per unit of waste.<br>• List of any AK Sufficiency Determinations requested for the waste stream.<br>• Certification through acceptable knowledge or testing that any waste assigned the hazardous waste number of U134 (hydrofluoric acid) no longer exhibits the characteristic of corrosivity. This is verified by ensuring that no liquid is present in U134 waste.<br>• A justification for the selection of radiography and/or VE as an appropriate method of characterizing the waste.<br>(Section C3-6b(2)) | | | | | |
| 56b | Are procedures in place to assure that ongoing container characterization results are cross referenced to Batch Data Reports? Section C3-6b | | | | | |
| 58 | Are procedures in place to ensure that project level reports are compiled into Characterization Information Summaries (Section C3-6b) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 59 | Are procedures in place to ensure that the generator/storage site uses forms for data reporting that are pre-approved forms in site-specific documentation? (Section C3-6) | | | | | |
| 60 | Are procedures in place to ensure that the generator/storage site's site project manager submits to the WIPP facility a summary of the waste stream information and reconciliation with data quality objectives (DQOs) once a waste stream is characterized? (Section C-4a(5)) | | | | | |
| 61 | Are procedures in place to ensure that the generator/storage site project office completes a WSPF based on the Batch Data Reports? C3-6b) | | | | | |
| 62 | Are procedures in place to ensure that the generator/storage Site Project Manager submits the WSPF to the Permittees for DOE's approval along with the accompanying Characterization Information Summary for that waste stream? (Section C-4a(5)) | | | | | |
| 63 | Are procedures in place to ensure that the generator/storage site maintains records related to waste characterization testing activities in the testing facility files, or site project files for those facilities located on-site? (Section C-4a(6)) | | | | | |
| 64 | Are procedures in place to ensure that the appropriate documented training and indoctrination is performed for all individuals and that procedures are documented in site specific QAPjPs and procedures? (Section C3-8) | | | | | |
| 66 | Are procedures in place to ensure that the generator/storage site has an appropriate records inventory and disposition schedule (RIDS) or equivalent that was prepared and approved by appropriate site personnel? (Section C-4a(6)) | | | | | |
| 67 | Are procedures in place to ensure that the generator/storage site maintains all records relevant to an enforcement action, regardless of disposition, until they are no longer needed for enforcement action, and then dispositioned per the approved RIDS? (Section C-4a(6)) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 68 | Are procedures in place to ensure that the generator/storage site maintains records that are designated as Lifetime Records for the life of the waste characterization program plus six years, or that the records have been transferred for permanent archival storage to the WIPP Records Archive facility? Lifetime Records include:<br>• Test facility Batch Data Reports,<br>• Waste Stream Characterization Package,<br>• Data reduction, validation, and reporting documentation,<br>• Acceptable knowledge documentation,<br>• WSPF and Characterization Information Summary<br>(Section C-4a(6), Table C-2) | | | | | |
| 69 | Are procedures in place to ensure that the generator/storage site maintains records that are designated as Non-Permanent Records for ten years from the date of record generation, and then dispositioned according per the approved RIDS or transferred to the WIPP Records Archive facility?<br>Non-Permanent Records include:<br>• Nonconformance documentation,<br>• Variance documentation,<br>• Assessment documentation,<br>• Calculations and related software documentation,<br>• Training/qualification documentation,<br>• QAPjP documentation (all revisions),<br>• Calibration documentation,<br>• Procurement documentation,<br>• QA procedures (all revisions),<br>• Technical implementing procedures (all revisions), and<br>• Audio/video recording (radiography, visual, etc.).<br>(Section C-4a(6), Table C-2) | | | | | |
| 70 | Are procedures in place to ensure that the generator/storage site has raw data that is identifiable and legible, and provides documentary evidence of quality? (Section C-4a(6)) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 71 | Are procedures in place to ensure that if the generator/storage site ceases to operate, that all records be transferred before closeout? (Section C-4a(6)) | | | | | |
| | **Shipment** | | | | | |
| 72 | Are procedures in place to ensure that the generator/storage site accurately completes an EPA Hazardous Waste Manifest prior to shipping the waste to WIPP that contains the following information:<br>• Generator/storage site name and EPA ID<br>• Generator/storage site contact name and phone number<br>• Quantity of waste<br>• List of up to six state and/or federal hazardous waste numbers in each line item<br>• Listing of all container IDS<br>• Signature of authorized generator representative<br>(Section C-5b) | | | | | |
| 73 | Are procedures in place to ensure that the generator/storage site accurately completes the following container specific information:<br>• Waste stream identification number<br>• List of hazardous waste numbers per container<br>• Certification data<br>• Shipping data<br>(Section C-5b) | | | | | |

1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to ask whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met

## Table C6-2 Acceptable Knowledge (AK) Checklist[1]

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **General Requirements** | | | | | |
| 134 | Are the primary document(s) required in Permit Attachment C4 containing acceptable knowledge information available? (Section C4-2) | | | | | |
| 135 | Has the generator developed a methodology whereby a logical sequence of acceptable knowledge information that progresses from general facility to more detailed waste-specific information can be acquired? (Section C4-2) | | | | | |
| 136 | Does the site have adequate procedures in place to ensure that the Acceptable Knowledge process is adequately implemented? Do these procedures facilitate the mandatory traceability analysis performed for each Summary Waste Category Group examined during the audit? (Section C4-2) | | | | | |
| 137 | Does the generator site's TRU mixed waste management program information clearly define (or provide a methodology for defining) waste categorization schemes and terminology, provide a breakdown of the types and quantities of TRU mixed waste generated/stored at the site, and describe how waste is tracked and managed at the generator site (including historical and current operations? Do procedures ensure that waste streams are adequately identified? (Section C4-2a) | | | | | |
| 138 | Does site documentation procedures indicate that the site will document, justify, and consistently define waste streams and assign EPA hazardous waste numbers? (Section C4-2b) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Required and Additional Information** | | | | | |
| 140 | Does the generator site document that the following must be included in the acceptable knowledge record:<br>• Map of the site with the areas and facilities involved in TRU waste generation, treatment, and storage identified<br>• Facility mission description as related to TRU waste generation and management (e.g., nuclear weapons research may involve metallurgy, radiochemistry, and nuclear physics operations that result in specific waste streams)<br>• Description of the operations that generate TRU waste at the site (e.g., plutonium recovery, weapons design, or weapons fabrication)<br>• Waste identification or categorization schemes used at the facility (e.g., item description codes, content codes)<br>• Types and quantities of TRU mixed waste generated, including historical generation through future projections<br>• Correlation of waste streams generated from the same building and process, as appropriate (e.g., sludge, combustibles, metals, and glass)<br>• Waste certification procedures for retrievably stored and newly generated wastes to be sent to the WIPP facility<br>(Section C4-2a) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 141 | Does the generator site document that the following shall be collected for each waste stream:<br>A. Area(s) and/or building(s) from which the waste stream was or is generated<br>B. Waste stream volume and time period of generation (e.g., 100 standard waste boxes of retrievable stored waste generated from June 1977 through December 1977)<br>C. Waste generating process described for each building (e.g., batch waste stream generated during decommissioning operations of glove boxes), including processes associated with U134 waste generation, if applicable.<br>D. Documentation demonstrating how the site has historically managed the waste, including the historical regulatory status of the waste (i.e., TRU mixed versus TRU non-mixed waste)<br>E. Process flow diagrams (e.g., a diagram illustrating glove boxes from a specific building to a size reduction facility to a container storage area). In the case of research/development, analytical laboratory waste, or the similar processes where process flow diagrams cannot be created, a description of the waste generating processes, rather than a formal process flow diagram, may be included if this modification is justified and the justification is placed in the auditable record<br>F. Material inputs or other information that identifies the chemical content of the waste stream and the physical waste form (e.g., glove box materials and chemical handled during glove box operations, events or processes that may have modified the chemical or physical properties of the waste stream after generation, data obtained through visual examination of newly generated waste that later undergoes radiography; information demonstrating neutralization of U134 [hydrofluoric acid] and waste compatibility)<br>(Section C4-2b) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 142 | Do site documents/procedures require that the facility will provide a summary to the Permittees that summarizes all information collected, including basis and rationale for all waste stream designations? Is an example of this summary available for audit review? If discrepant hazardous waste data exist in required information, do sites consider applying all hazardous waste numbers, but assess and evaluate the information to determine the appropriate hazardous waste numbers consistent with RCRA requirements?<br>(Section C4-2b) | | | | | |
| 143 | Do site procedures indicate that if the required AK information is not available for a particular waste stream, that the waste stream will not be eligible for an AK Sufficiency Determination? (Section C4-2) | | | | | |
| 144 | Have the following procedures been prepared?<br>A. Procedures for identifying and assigning the physical waste form of the waste<br>B. Procedures for delineating waste streams and assigning Waste Matrix Codes<br>C. Procedures for resolving inconsistencies in acceptable knowledge documentation<br>D. Procedures for visual examination and/or radiography, if applicable<br>E. For newly generated waste, procedures describing process controls used to ensure prohibited items (specified in the WAP, Permit Attachment C) are documented and managed<br>F. Procedures to ensure radiography and visual examination include a list of prohibited items that the operator shall verify are not present in each container (e.g. liquid exceeding TSDF-WAC limits, corrosives, ignitables, reactives, and incompatible wastes)<br>G. Procedures to document how changes to Waste Matrix Codes, waste stream assignment, and associated Environmental Protection Agency hazardous waste numbers based on material composition are documented for any waste<br>H. Procedures that ensure the assignment of EPA hazardous waste numbers is appropriate, consistent with RCRA requirements, and adequately considers site historical waste management<br>I. Procedures for estimating waste material parameter weights<br>(Section C4-2b) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 145 | Does the generator provide procedures or written commitment to collect additional acceptable knowledge information, as available and as necessary to augment mandatory information?<br>(Section C4-2c) | | | | | |
| 146 | Does the generator site document that all additional specific, relevant information used in the acceptable knowledge process will be identified and its use explained? Is all necessary additional information assembled and has it been appropriately used? (Section C4-2c) | | | | | |
| 147 | Does the generator site discrepancy analysis documentation (for acceptable knowledge additional and required documentation) indicate that if discrepancies are detected, the site may consider applying all hazardous waste numbers indicated in the required and additional information, but must assess and evaluate the information to determine the appropriate hazardous waste numbers consistent with RCRA requirements? (Section C4-2c) | | | | | |
| | **Training** | | | | | |
| 148 | Does the generator site have procedures to ensure that all personnel involved with acceptable knowledge waste characterization have the following training, and is this training documented?<br>A. WIPP WAP in Permit Attachment C and the TSDF-WAC specified in this permit<br>B. State and Federal RCRA regulations associated with solid and hazardous waste characterization<br>C. Discrepancy resolution and reporting<br>D. Site-specific procedures associated with waste characterization using acceptable knowledge<br>(Section C4-3a) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Procedures** | | | | | |
| 149 | Has the generator site developed the following procedures, and are these procedures technically sufficient?<br>A. Sites must prepare and implement a written procedure outlining the specific methodology used to assemble acceptable knowledge records, including the origin of the documentation, how it will be used, and any limitations associated with the information (e.g., identify the purpose and scope of a study that included limited sampling and analysis data).<br>B. Sites must develop and implement a written procedure to compile the required acceptable knowledge record.<br>C. Sites must develop and implement a written procedure that ensures unacceptable wastes (e.g., reactive, ignitable, corrosive) are identified and segregated from TRU mixed waste populations sent to WIPP.<br>D. Sites must prepare and implement a written procedure to evaluate acceptable knowledge and resolve discrepancies. For Example if different sources of information indicate different hazardous wastes are present, then sites must include all sources of information in its records and may choose to either conservatively assign hazardous waste numbers or assign only those numbers deemed appropriate and consistent with RCRA requirements. All information used to justify assignment of hazardous waste numbers must be placed in the auditable record. Further, the assignment of hazardous waste numbers shall be tracked in the auditable record to all required documentation. | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 149a | E. Sites must prepare and implement a written procedure to identify hazardous wastes and assign the appropriate hazardous waste numbers to each waste stream. The following are minimum baseline requirements/standards that site-specific procedures must include to ensure comparable and consistent characterization of hazardous waste:<br>1. Compile all of the required information in an auditable record.<br>2. Review the compiled information and delineate waste streams. Delineation of waste streams must comply with the definition in Permit Attachment C, Section C-0a, and justify combining waste historically managed separately as TRU mixed and TRU non-mixed waste streams into a single waste stream.<br>3. Review the compiled information to determine if the waste stream is compliant with the TSDF-WAC<br>4. Review the required information to determine if the waste is listed under 20.4.1.200 NMAC (incorporating 40 CFR § 261), Subpart D. Assign all listed hazardous waste numbers, unless the site chooses to justify an alternative assignment and document the justification in the auditable record.<br>5. Review the required information to determine if the waste exhibits a hazardous characteristic or may contain hazardous constituents included in the toxicity characteristics specified in 20.4.1.200 NMAC (incorporating 40 CFR § 261, Subpart C. If a toxicity characteristic contaminant is identified and is not included as a listed waste, sites may evaluate available data and assign the toxicity characteristic hazardous waste number consistent with RCRA requirements. All data examined to reach the hazardous waste number determination must be placed in the auditable record and must present a clear justification for the hazardous waste number analyses.<br>6. Review the compiled information to provide an estimate of the material parameter weights for each container to be stored or disposed of at WIPP. For newly generated waste, procedures shall be developed and implemented to characterize hazardous waste using acceptable knowledge prior to packaging. | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 149b | F. Sites shall ensure that results of audits of the TRU mixed waste characterization programs at the site are available in the records.<br>G. Sites shall identify all process controls (implemented to ensure that the waste contains no prohibited items and to control hazardous waste content and/or physical form) that have been applied to retrievably stored waste and/or may presently be applied to newly generated waste. Process controls are applied <u>at the time</u> of waste generation/packaging to control waste content, whereas any activities performed <u>after</u> waste generation/packaging to identify prohibited items, hazardous waste content, or physical form are waste characterization activities, not process controls. The AK record must contain specific process control and supporting documentation identifying when these process controls are used to control waste content. See Permit Attachment C, Section C-2 for programmatic requirements related to process controls.<br>(Section C4-3b) | | | | | |
| 150 | Does the site have implemented procedures which comply with the following criteria to establish acceptable knowledge records:<br>A. Acceptable knowledge information shall be compiled in an auditable record, including a road map for all applicable information.<br>B. The overview of the facility and TRU mixed waste management operations in the context of the facility's mission shall be correlated to specific waste stream information.<br>C. Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities shall be clearly described. For newly generated wastes, the rate and quantity of waste to be generated shall be defined.<br>D. A reference list shall be provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support the acceptable knowledge information.<br>E. Container inventories for TRU mixed waste in retrievable storage shall be delineated into waste streams by correlating the container identification to all of the required and additional AK information<br>(Section C4-3c) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 151 | If the generator site submitted an AK Sufficiency Determination Request for a specific waste stream, did the site provide all of the requisite information for which approval is sought?<br>(Section C-0b) | | | | | |
| | **Re-evaluating Acceptable Knowledge** | | | | | |
| 152 | Does the generator site have written procedures for the augmentation of all acceptable knowledge information using testing. Testing consists of radiography and visual examination. Do site procedures indicate that the following testing will be conducted based upon the results of the Determination Request<br>AKSD denied - 100% RTR or VE<br>(Section C4-1, C-0b) | | | | | |
| 155 | Does the generator site have procedures for reevaluating acceptable knowledge if the results of the waste confirmation indicate that the waste to be shipped does not match the approved waste stream or if the data from radiography or visual examination for waste streams without an AK Sufficiency Determination exhibit this discrepancy? Does this procedure describe how the waste is reassigned, acceptable knowledge reevaluation, and appropriate hazardous waste numbers are assigned?<br>(Section C4-3e) | | | | | |
| 156 | Do site procedures indicate that debris wastes are assigned toxicity characteristic EPA numbers based on AK regardless of the quantity or concentration? (C4-3e) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Criteria for Assembling an Acceptable Knowledge Record Delineating the Waste Stream** | | | | | |
| 158 | If wastes are reassigned to a different waste matrix code based on site visual examination or radiography or Permittee confirmation activities, does the generator site have written documentation to ensure that the following steps are followed:<br>F. Review existing information based on the container identification number and document all differences in hazardous waste number assignments<br>G. If differences exist in the hazardous waste numbers that were assigned, reassess and document all required acceptable knowledge information (Section C4-3b) associated with the new designation<br>H. Reassess and document all testing data associated with the waste<br>I. Verify and document that the reassigned waste matrix code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination<br>J. Record all changes to acceptable knowledge records<br>K. If discrepancies exist in the acceptable knowledge information for the revised waste matrix code, document the segregation of the affected portion of the waste stream, and define the actions necessary to fully characterize the waste<br>(Section C4-3e) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Data Quality Requirements** | | | | | |
| 168 | Are acceptable knowledge processes consistently applied among all generator sites, and does each generator site comply with the following data quality requirements for acceptable knowledge documentation:<br>A. Precision -. The qualitative determinations, such as compiling and assessing acceptable knowledge documentation, do not lend themselves to statistical evaluations of precision. However, the acceptable knowledge information will be addressed by the independent review of acceptable knowledge information during internal and external audits.<br>B. Accuracy - The percentage of waste containers which require reassignment to a new waste matrix code and/or designation of different hazardous waste numbers based on testing data and discrepancies identified by the Permittees during waste confirmation will be reported as a measure of acceptable knowledge accuracy.<br>C. Completeness - The acceptable knowledge record must contain 100 percent of the information (Permit Attachment C4-3). The usability of the acceptable knowledge information will be assessed for completeness during audits. | | | | | |
| 168a | D. Comparability - Comparability is ensured through sites meeting the training requirements and complying with the minimum standards outlined for procedures that are used to implement the acceptable knowledge process. All sites must assign hazardous waste numbers in accordance with Permit Attachment C4-4 and provide this information regarding its waste to other sites who store or generate a similar waste stream.<br>E. Representativeness - Representativeness is a qualitative parameter that will be satisfied by ensuring that the process of obtaining, evaluating, and documenting acceptable knowledge information is performed in accordance with the minimum standards established in Permit Attachment C4. Sites also must assess and document the limitations of the acceptable knowledge information used to assign hazardous waste numbers (e.g., purpose and scope of information, date of publication, type and extent to which waste parameters are addressed).<br>(Section C3-3) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 169 | Does the generator site address quality control by tracking its performance with regard to the use of acceptable knowledge by: 1) assessing the frequency of inconsistencies among information, and 2) documenting the results of waste discrepancies identified by the generator/storage site during waste characterization or the Permittees during waste confirmation using radiography, review of radiography audio/video recordings, visual examination, or review of visual examination records. In addition, the acceptable knowledge process and waste stream documentation must be evaluated through internal assessments by generator/storage site quality assurance organizations. (Section C4-3e) | | | | | |

1. NMED expects a traceability analysis to be performed, the results of which should be presented on this checklist under the “Examples of Implementation” column. Further, the traceability analysis process and results should be discussed in the Final Audit Report.
2. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.

## Table C6-3 Radiography Checklist

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Quality Assurance Objectives** | | | | | |
| 233 | Are process procedures in place to meet the following Quality Assurance Objectives?<br><u>Precision</u><br>• Does the site describe in its QAPjP and SOP(s) activities to reconcile any discrepancies between two radiography operators with regard to identification of the waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases through independent replicate scans and independent observations? And additionally, activities to verify the precision of radiography prior to use by tuning precisely enough to demonstrate compliance with QAOs through viewing an image test pattern?<br><u>Accuracy</u><br>• Was accuracy obtained by using a target to tune the image for maximum sharpness and by requiring operators to successfully identify 100 percent of the required items in a training container during their initial qualification and subsequent requalification? | | | | | |
| 233a | <u>Completeness</u><br>• Was an audio/videotape (or equivalent media) of the radiography examination and a radiography data form validated according to the requirements in Section C3-4?<br>• Was an audio/videotape (or equivalent media) of the radiography examination and a radiography data form obtained for 100% of the waste containers subject to radiography?<br><u>Comparability</u><br>• Is comparability ensured through the use of standardized radiography procedures and operator training and qualifications<br>(Section C3-2a) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Characterization and System Requirements** | | | | | |
| 234 | Does the site have procedures to ensure that radiography is used to identify and verify waste container contents and verify the waste's physical form? Does the site have procedures to identify prohibited materials? (Section C-3b; C1-1) | | | | | |
| 235 | Do procedures or other supporting documentation ensure that <u>every</u> waste container will undergo radiography and/or VE as necessary to augment AK? (Section C-3b) | | | | | |
| 236 | Do procedures ensure that containers whose contents prevent full examination are examined by visual examination rather than by radiography unless the site certifies that visual examination would provide no additional relevant information for that container based on the AK information for the waste stream? (Section C1-1) | | | | | |
| 237 | Do procedures or other supporting documentation ensure that the physical form determined by radiography is compared with the waste stream descriptions? If discrepancies are noted, will a new waste stream be identified? (Section C-3b) | | | | | |
| 238 | Are there procedures to ensure the data is obtained from an audio/video recorded scan provided by trained radiography operators? (Section C1-1) | | | | | |
| 239 | Were all activities required to achieve the radiography objective described in site Quality Assurance Project Plans (QAPjPs) and Standard Operating Procedures (SOPs)? (Section C3-2) | | | | | |
| 240 | Did the radiography system consist of the following equipment or equivalent:<br>• an X-ray producing device?<br>• an imaging system?<br>• an enclosure for radiation protection?<br>• a waste container handling system?<br>• an audio/video recording system or equivalent?<br>• an operator control and data acquisition station?<br>(Section C1-1) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 241 | Did the X-ray producing device have controls which allow the operator to vary voltage, thereby controlling image quality? Was it possible to vary the voltage, typically between 150-400 kV, to provide an optimum degree of penetration through the waste? Was high-density material examined with the X-ray device set on the maximum voltage? Was low-density material examined at lower voltage settings to improve contrast and image definition? (Section C1-1) | | | | | |
| 242 | Do procedures or other documentation ensure that an audio/videotape or equivalent is made of the waste container scan and maintained as a non-permanent record? (Section C1-1) | | | | | |
| | **Data Compilation** | | | | | |
| 243 | Are there procedures to ensure that a radiography data form is used to document the waste matrix code, ensure the waste container contains no ignitable, corrosive or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and verify that the physical form of the waste is consistent with the waste stream description documented on the WSPF? (Section C1-1) | | | | | |
| 245 | If radiography indicates that the waste does not match the waste stream description, do procedures ensure that the appropriate corrective action was taken? (Section C-3b) | | | | | |
| 246 | If a discrepancy is noted, do procedures ensure that the proper waste stream assignment is determined, the correct hazardous waste numbers assigned, and the resolution documented? (Section C-3b) | | | | | |
| | **Training** | | | | | |
| 247 | Do site procedures ensure that only trained personnel are allowed to operate radiography equipment? (Section C1-1) | | | | | |
| 248 | Do site procedures ensure that training requirements for radiography operators is based upon existing industry standard training requirements? (Section C1-1) | | | | | |
| 249 | Does the documented training program provide radiography operators with both formal and on-the-job training (OJT)? (Section C1-1) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 250 | Does the documented training program ensure that the radiography operators are instructed in the specific waste generating practices and typical packaging configurations expected to be found in each waste stream at the site? (Section C1-1) | | | | | |
| 251 | Does the documented training program ensure that the OJT and apprenticeship are conducted by an experienced, qualified radiography operator prior to qualification of the candidate? (Section C1-1) | | | | | |
| 252 | Is the documented training program site specific? (Section C1-1) | | | | | |
| 262 | Does the documented training program ensure that a training drum with various container sizes is scanned by each operator on a semiannual basis? Is the videotape reviewed by a supervisor to ensure that operators' interpretations remain consistent and accurate? (Section C1-1) | | | | | |
| 263 | Do site procedures ensure that the site prepares Testing Batch Data Reports or equivalent which includes all data pertaining to radiography for up to 20 waste containers without regard to waste matrix? (Section C3-4) | | | | | |
| | **Quality Assurance** | | | | | |
| 265 | Does the documented training program ensure that the imaging system characteristics are verified on a routine basis? (Section C1-1) | | | | | |
| 266 | Do procedures ensure that independent replicate scans and replicate observations of the video output of the radiography process are performed under uniform conditions and procedures? Are independent replicate scans performed on one waste container per day or per testing batch of 20 samples, which ever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container? Are independent observations of one scan (not the replicate scan) performed once per day or per testing batch, which ever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container? (Section C1-1) | | | | | |
| 267 | Do procedures ensure that oversight functions include periodic audio/video media reviews of accepted waste containers, are performed by qualified radiography operators that were not involved in the original scans of the waste containers? (Section C1-1) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 268 | Is the site project manager responsible for monitoring the quality of the radiography data and calling for corrective action, when necessary? (Section C1-1) | | | | | |
| | **Data Validation, Review, Verification and Reporting** | | | | | |
| 277 | Do procedures ensure that all applicable data generation review verification and validation activities specified in C3-4 are followed, including all signatory releases? (Section C3-4) | | | | | |
| 278 | Do procedures ensure that radiography tapes have been reviewed at a frequency of one waste container per day or once per testing batch, whichever is less frequent, to ensure data are correct and completed? (Section C1-1) | | | | | |
| 279 | Do procedures ensure that all applicable project-level signatory releases and DQOs (Section C3-3) as specified in the WAP are performed? (Section C3-4b) | | | | | |
| 282 | At the data generation level, do procedures ensure that all electronic and video data stored appropriately to ensure that waste container, sample, and associated QA data are readily retrievable? Are radiography tapes reviewed, at a frequency of one waste container per day or once per testing batch, whichever is less frequent, against the data reported on the radiography form? (Section C3-4a, C3-4a(1)) | | | | | |
| 283 | At the project level, do procedures require the Site Project Manager to certify that the radiography data are complete and acceptable based on the videotape review of at least one waste container per testing batch or daily, whichever is less frequent? (Section C3-4b(1)) | | | | | |

1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.

## Table C6-4 Visual Examination (VE) Checklist

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Training** | | | | | |
| 296 | Is there documentation which shows that a standardized training program for visual examination operators has been developed? Is it specific to the site and include the various waste configurations generated/stored at the site? (Section C1-2) | | | | | |
| 297 | Is there documentation which shows that the visual examination operators receive training on the specific waste generating processes, typical packaging configurations, and waste material parameters expected to be found in each Waste Matrix Code at the site? (Section C1-2) | | | | | |
| 298 | Are the visual examination personnel requalified once every two years? (Section C1-2) | | | | | |
| 298a | Does the training include the following regardless of Summary Category Group?<br>• Identifying and describing the contents of a waste container by examining all items in waste containers of previously packaged waste.<br>• Identifying when VE cannot be used to meet the DQOs,<br>(Section C1-2) | | | | | |
| | **Visual Examination Expert Requirements** | | | | | |
| 300 | Does documentation ensure that the site has designated a visual examination expert? Is the visual examination expert familiar with the waste generating processes that have taken place at the site? Is the visual examination expert familiar with all of the types of waste being characterized at that site? (Section C1-2) | | | | | |
| 301 | Does documentation ensure that the visual examination expert shall be responsible for the overall direction and implementation of the visual examination aspects of the program? Does the site's QAPjP specify the selection, qualification, and training requirements of the visual examination expert? (Section C1-2) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Visual Examination Procedures** | | | | | |
| 304 | Do procedures indicate that all visual examination activities are documented on video/audio media or VE performed by using a second operator to provide additional verification by reviewing the contents of the waste container to ensure correct reporting? (Section C1-2) | | | | | |
| 304a | Are procedures in place to ensure that when VE is performed using a second operator, each operator performing VE shall observe for themselves the waste being placed in the container or the contents within the examined waste container when waste is not removed?<br>(Section C1-2) | | | | | |
| 313 | Do site procedures ensure that when liquid is found, the non-transparent internal container holding the liquid will be assumed to be filled with liquid and this volume will be added to the total liquid in the container being characterized using VE? The container being characterized using VE would then be rejected and/or repackaged to exclude the internal container if it is over the TSDF-WAC limits. (Section C-3b) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Quality Assurance Objectives** | | | | | |
| 314 | Are process procedures in place to meet the following Quality Assurance Objectives?<br><u>Precision</u><br>• Precision is maintained by reconciling any discrepancies between the operator and the independent technical reviewer with regard to identification of waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases.<br><u>Accuracy</u><br>• Accuracy is maintained by requiring operators to pass a comprehensive examination and demonstrate satisfactory performance in the presence of the VE expert during their initial qualification and subsequent requalification.<br><u>Completeness</u><br>• A validated VE data form will be obtained for 100 percent of the waste containers subject to VE.<br><u>Comparability</u><br>• The comparability of VE data from different operators shall be enhanced by using standardized VE procedures and operator qualifications.<br>(Section C3-2b) | | | | | |

1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.

# ATTACHMENT C6

# AUDIT AND SURVEILLANCE PROGRAM

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# ATTACHMENT C6

# AUDIT AND SURVEILLANCE PROGRAM

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# ATTACHMENT C6

# AUDIT AND SURVEILLANCE PROGRAM

## C6-1 Introduction

The Waste Isolation Pilot Plant (**WIPP**) Audit and Surveillance Program shall ensure that: 1) the operators of each generator/storage site (**site**) ~~and U.S. Department of Energy (**DOE**) approved laboratory~~ that plan to transport transuranic (**TRU**) mixed waste to the WIPP facility conduct ~~sampling and analysis~~testing of wastes in accordance with the current WIPP Waste Analysis Plan (**WAP**) (Permit Attachment C), and 2) the information supplied by each site to satisfy the waste screening and acceptability requirements of Section C-4 of the WAP is being managed properly. DOE will conduct these audits and surveillances at each site ~~and DOE approved laboratory~~ performing these activities in accordance with a standard operating procedure (**SOP**). NMED personnel may observe these audits and surveillances to validate the implementation of WAP requirements (Permit Attachment C) at each site ~~and DOE approved laboratory~~. Only personnel with appropriate U.S. Department of Energy clearances will have access to classified information during audits. Classified information will not be included in audit reports and records. The audit SOP will contain steps for selecting audit personnel, reviewing applicable background information, preparing an audit plan, preparing audit checklists, conducting the audit, developing an audit report, and following up audit deficiencies. A deficiency is any failure to comply with an applicable provision of the WAP. The checklists for each site ~~and DOE approved laboratory~~ shall include, at a minimum, the appropriate checklists found in Tables C6-1 through C6-~~6~~ 4 for the summary category groups undergoing audit.

## C6-2 Audit Procedures

Audit procedures shall establish the responsibilities and methodology for planning, scheduling, performing, reporting, verifying, and closing announced and unannounced audits of sites ~~and DOE approved laboratories~~. Records of all audit activities shall be part of the WIPP Operating Record and maintained at the WIPP facility until closure. NMED shall be provided unlimited access to these records.

Approved procedures shall be used to describe audit activities and requirements. Procedures define the responsibilities of specific positions necessary to manage this audit program. The DOE manager who oversees the audit program shall ensure that the following tasks are performed:

- Schedule audits
- Designate lead auditor(s)
- Appoint auditor and lead auditor trainees
- Maintain auditor training and qualification records
- Assure that all auditors have been given appropriate training, including training on the WAP

- Assign auditors and lead auditors to perform annual certification audits
- Review and approve final audit reports
- Oversee tracking and closure of all deficiencies and any observations requiring action
- Assure records are entered into the WIPP Operating Record and are properly maintained until facility closure

C6-3 Audit Position Functions

DOE will approve lead auditors, auditors, and technical specialists based upon the expertise required for the functions being examined according to the audit scope. DOE will supply auditors/technical specialists with expertise in the Resource Conservation and Recovery Act (**RCRA**) requirements and knowledge of the ~~analysis~~ testing and documentation methods required to verify the hazardous waste characterization performed by the sites. DOE shall identify all audit team members to NMED prior to the audit, and shall provide upon request the qualifications of all audit team members.

The lead auditor assigned to be the audit team leader must perform the following tasks:

- Concur that assigned auditors and technical specialists have the collective experience and training commensurate with the scope, complexity, or special nature of the activities to be audited
- Develop an audit plan and coordinate the preparation of an overall checklist to cover the scope of the audit, with consideration given to all nonconformances reported as specified in Permit Attachment C3 and to previous audit results from that site ~~or DOE approved laboratory~~
- Assign specific audit areas to individual auditors and technical specialists within their particular specialty and provide guidance on checklist development
- Review individual auditor checklists to assure complete coverage of assigned scope, and approve the checklists
- Conduct the audit at the site ~~or DOE approved laboratory~~
- Encourage observers to participate according to the protocol established by DOE
- Communicate audit results at the conclusion of the audit, including any deficiencies and observations
- Prepare and sign the audit report
- Maintain complete records of each audit and transfer them to the manager when the audit report is issued

Auditors and technical specialists assigned to the specific audit will report to the audit team leader for supervision and may perform the following tasks:

- Attend any required specific training and team orientation and planning meetings as directed by the audit team leader
- Prepare specific audit checklists to verify that the WAP Quality Assurance Objectives (**QAO**) are met for the areas being audited
- Obtain audit team leader approval of checklist
- Review acceptable knowledge documentation packages, test report data, and documentation of data verification activities
- Obtain and evaluate objective evidence by means of observation, document reviews, or the conduct of interviews with operators, ~~analysts,~~ technicians, and others necessary to determine the adequacy and effective implementation of the WAP
- Conduct inspection tours of waste generating stations, ~~sampling areas and equipment, analytical laboratories~~waste testing facilities, calibration facilities, administrative, and document control/record facility
- Complete checklist during the audit indicating the objective evidence observed verifies that the site ~~or DOE approved laboratory~~ has met the QAOs for the program elements, methods, and the activities being audited. Add other items to the checklist as they are observed or as needed during the audit
- Prepare narrative statements for all deficiencies, and observations that clearly and concisely identify the conditions involved
- Prepare any portion of the final audit report assigned by the lead auditor.

Audits will be conducted at least annually for each site involved in the waste characterization program. Both announced and unannounced audits will address the following:

- Results of previous audits
- Changes in programs or operations
- New programs or activities being implemented
- Changes in key personnel

Annual certification audits shall address contact-handled (**CH**) and remote-handled (**RH**) waste characterization activities if the site has approval or is seeking approval for such wastes. At a minimum, the audit shall evaluate acceptable knowledge documentation for CH and RH waste separately by Summary Category Group, as applicable.

## C6-4 Audit Conduct

The conduct of the audit shall commence with an entrance meeting, conducted by the audit team leader, with site ~~or DOE approved laboratory~~ management. At this meeting, the audit objectives and scope, the specific areas to be audited, the processes or functions to be

observed, and the site ~~or DOE approved laboratory~~ participation required, including site interfaces, will be identified. The purpose of this meeting is to confirm the audit scope, discuss the audit sequence, establish channels of communication, and confirm the daily and exit meeting. Audits shall be performed using approved audit checklists that include the checklists in Tables C6-1 to C6-~~6~~ 4 for the summary category groups undergoing audit. Consistency of evaluation shall be ensured before the audit through site ~~or DOE approved laboratory~~ QAPjP approval (see Permit Attachment C5). QAPjPs for each site ~~or DOE approved laboratory~~ shall incorporate the same requirements from the WAP. Objective evidence shall be examined (to the depth necessary) to determine if the identified activities, procedures, or QAOs are adequate and are being effectively implemented.

Audits may not include all waste summary category groups, and thus some audit checklists or portions of checklists (Tables C6-1 through C6-~~6~~4) may not be applicable to some sites ~~or DOE approved laboratory~~ (e.g., approved acceptable knowledge sufficiency determination request for one or more waste streams at a site ~~headspace gas sampling and analysis is not used because debris waste is not being analyzed by the site~~). In these instances, DOE shall indicate nonapplicability in the appropriate checklist row, and justify the exclusion under the “Comment” column. In addition, in cases where discrepancies exist between the audit checklists in Tables C6-1 through C6-~~6~~ 4 and the Permit, Permit requirements take precedence. DOE may add to the checklists as necessary to clarify Permit requirements, but any additions will be clearly designated on the checklists (i.e., redline the additions).

Audits shall include site personnel interviews, document and record reviews, observations of operations, and any other activities deemed necessary by the auditors to meet the objectives of the audit. Observations or deficiencies identified during the audit will be investigated or evaluated, as necessary, to determine if they are isolated conditions or represent a general breakdown of the waste characterization quality assurance program. During audit interviews or audit meetings, site ~~or DOE approved laboratory~~ personnel may be advised of deficiencies identified within their areas of responsibility to establish a clear understanding of the identified condition.

The site ~~or DOE approved laboratory~~ personnel will be given the opportunity to correct any deficiency that can be corrected during the audit period. Deficiencies and observations will be documented and included as part of the final audit report. Those items that have been resolved during the audit (isolated deficiencies that do not require a root cause determination or actions to preclude recurrence), will be verified prior to the end of the audit, and the resolution will be described in the audit report. Those items that affect the quality of the program, and/or the data generated by that program, which are required by the WAP will be documented on a Corrective Action Report (**CAR**) and included as a part of the final audit report. The CAR will be entered into DOE’s CAR tracking system and tracked until closure. RCRA-related items will be uniquely identified within the CAR tracking system so that they can be tracked separately. RCRA-related CARs identified by the site ~~or DOE approved laboratory~~ during self-audits will be evaluated during DOE’s audit and surveillance program and tracked in DOE’s tracking systems.

When a deficiency is identified by the audit team, the audit team member who identified the deficiency prepares the CAR. DOE reviews the CAR, determine validity (assures that a requirement has in fact been violated), classify the significance of the deficiency, assign a response due date, and issue the CAR to the site ~~or DOE approved laboratory~~. The site ~~or DOE approved laboratory~~ reviews the CAR, evaluates the extent and cause of the deficiency, and provides a response to DOE indicating the remedial actions and actions taken to preclude

recurrence. DOE reviews the response from the site ~~or DOE approved laboratory~~ and, if acceptable, communicate the acceptance to the site ~~or DOE approved laboratory~~. The site ~~or DOE approved laboratory~~ completes remedial actions and actions to preclude recurrence. After all corrective actions have been completed, DOE may schedule and perform a verification visit to assure that corrective actions have been completed and are effective. NMED personnel may participate as observers in these verification visits. When all actions have been completed and verified as being effective, the CAR is closed by the DOE manager responsible for quality assurance. As part of the planning process for subsequent audits and surveillances, past deficiencies will be reviewed and the previous deficient activity or process is subject to reassessment.

NMED may submit a written Observer Inquiry to DOE if necessary to seek resolution to a question raised or issue posed during the audit. DOE shall be responsible for obtaining a response to the Observer Inquiry and submitting a written response to NMED within 30 days of inquiry submission. NMED will examine the response and consider this information as part of the audit review and approval process.

The sites ~~or DOE approved laboratories~~ shall submit corrective action plans to eliminate the deficiency stated on the CAR, including a resolution of the acceptability of any data generated prior to the resolution of the corrective action.

The corrective action response will include a discussion of the investigation performed to determine the extent and impact of the deficiency, a description of the remedial actions taken, determination of root cause, and actions to preclude recurrence.

An exit meeting will be conducted by the lead auditor prior to departure of the audit team from the site ~~or DOE approved laboratory~~. This meeting will include site ~~or DOE approved laboratory~~ management personnel, and may include DOE field office personnel. All draft audit results will be presented to the site ~~or DOE approved laboratory~~ management.

The audit report will be prepared, approved, and issued to the site ~~or DOE approved laboratory~~ within 30 days of the completion of the audit by DOE. NMED shall receive a copy of the audit report upon issuance for information purposes. A formal final audit report will be provided to NMED which will include WAP-related CAR resolution results and audit results that will include, as a minimum, sections describing the scope, purpose, summary of deficiencies, and observations in narrative format, completed audit checklists, audited procedures, and other applicable documents which provide evidence of WAP implementation. The report will also include an identification of the organization audited, the dates of the audit, and the requested response date. NMED will make the final audit report available for public review and comment. One copy of the formal final audit report shall be submitted to NMED in hard copy, but any additional copies may be submitted in electronic format. The audited site ~~or DOE approved laboratory~~ will respond to any deficiencies and observations within (30 days after receipt of any CARs and indicate the corrective action taken or to be taken. If the corrective action has not been completed, the response must indicate the expected date the action will be completed. CARs applicable to WAP requirements shall be resolved prior to waste shipment. Subsequent audits or specific verifications, announced or unannounced, will determine if the corrective action has been satisfactorily implemented. Deficiencies (items corrected during the audit [**CDAs**] and CARs) and observations will be tracked to completion according to established procedure(s). In addition, deficiencies will be trended to determine if similar situations exist system wide. Trend reports will be issued as necessary to provide a “lessons learned”

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announcement to other sites ~~or DOE approved laboratories~~ who might benefit from program improvements implemented as a result of resolutions to the specific situations discovered at the performance of these audits.

The final audit report provided to NMED and audit records will be maintained at WIPP as a part of the Operating Record. These records will be included on the Record Inventory and Disposition Schedule and maintained on-site until closure of the WIPP facility. NMED shall be provided unlimited access to these records.

# TABLES

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~~**Table C6-1 Waste Analysis Plan (WAP) Checklist**~~

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1 **Table C6-1 Waste Analysis Plan (WAP) General Checklist for use at DOE'S Generator/Storage Sites**

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Waste Stream Identification** | | | | | |
| 1 | Does the generator/storage site define "waste stream" as waste materials that have common physical form, that contain similar hazardous constituents, and that are generated from a single process or activity? (Attachment C Section C-0a) | | | | | |
| 2 | Are procedures in place to ensure that the generator/storage site assigns one of the Summary Category Groups (S3000-homogeneous solids, S4000-soils/gravel, S5000-debris waste) to each waste stream? (Section C-1b) | | | | | |
| 3 | Are procedures in place to ensure that the generator/storage site assigns Waste Matrix Code Groups (e.g., solidified inorganics, solidified organics, salt waste, soils, combustible waste, filters, graphite, heterogeneous debris waste, inorganic nonmetal waste, lead/cadmium metal, uncategorized metal) to each waste stream? (Section C-0a) | | | | | |
| 4 | Are procedures in place to ensure that the generator/storage site assigns a Waste Stream WIPP Identifier (ID) to each waste stream? (Section C3-~~12b~~6b(1)) | | | | | |

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| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 4a | Are procedures in place for generator/storage sites to submit an AK Sufficiency Determination (Determination Request) to the Permittees to meet all or part of the waste characterization requirements including:<br>• All information specified in Permit Attachment C4, Section C4-3d<br>• Identification of relevant hazardous constituents, and correctly identifies all toxicity characteristic and listed hazardous waste numbers<br>• All hazardous waste number assignments must be substantiated by supporting data and, if not, whether this lack of substantiation compromises the interpretation<br>• Resolution of data discrepancies between different AK sources must be technically correct and documented<br>• The AK Summary includes all the identification of waste material parameter weights by percentage of the material in the waste stream, and determinations are technically correct<br>• All prohibited items specified in the TSDF-WAC should be addressed, and conclusions drawn are technically adequate and substantiated by supporting information<br>• 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.<br>• The site must provide the supporting information necessary to substantiate technical conclusions within the Determination Request, and this information must be correctly interpreted.<br>(Section C-0b, Section C4-3d) | | | | | |
| 4b | If a generator/storage site does not submit a Determination Request or if the Determination Request is not approved, are procedures in place for the generator/storage site to perform radiography or VE on 100% of the containers in a waste stream~~ and chemical sampling and analysis on a representative sample of the waste stream using headspace gas sampling and analysis (for debris waste) or solids sampling and analysis (for homogeneous solid or soil/gravel waste) as specified in Permit Attachments C1 andC2~~ as specified in Permit Attachment C1?<br>(Section C-0b) | | | | | |

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| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 4c | Are procedures in place to ensure that the generator/storage sites complete a Waste Stream Profile Form (WSPF) and Characterization Information Summary (CIS) as specified in Permit Attachment C3, Sections C3-~~12b~~6b(1) and C3-~~12b~~6b(2)?<br>(Section C-0c) | | | | | |
| ~~5~~ | ~~Are procedures in place to ensure that the generator/storage site divides waste streams into waste stream lots if all of the waste within a waste stream is not accessible for sampling and analysis, as required, at one time? If so, is the division of waste streams into waste stream lots based on staging, transportation and handling issues? (Section C-1a)~~ | | | | | |
| 6 | Are procedures in place to ensure that the generator/storage site assigns EPA hazardous waste numbers associated with the waste? If so, do these assigned EPA hazardous waste numbers correspond to the permitted EPA hazardous waste numbers in Table C-~~9~~5? Are there any assigned EPA hazardous waste numbers that are not permitted EPA hazardous waste numbers on the Table C-~~9~~5? If so, did the generator/storage site reject the waste for shipment to and disposal at WIPP? Did the generator assign a state hazardous waste codes or numbers? If so, is it assigned to waste that is permitted at WIPP? (Section C-1b) | | | | | |
| 7 | Are procedures in place to ensure that Summary Category Groups are defined as follows:<br>S3000- Homogeneous solids are solid material, inorganic process residues, inorganic sludges, salt waste, and pyrochemical salt waste excluding soils, that do not meet NMED criteria for classification as debris and are at least 50 percent by volume homogeneous solids or comprise the majority of the waste stream<br>S4000- Waste streams that are at least 50 percent by volume soil/gravel, or comprise the majority of the waste stream<br>S5000- Waste streams that are at least 50 percent volume materials that meet the NMED criteria for debris, or comprise the majority matrix of materials. The criteria for debris are solid materials intended for disposal that exceed 2.36 inch particle size and is a manufactured object, plant or animal matter, or 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.<br>(Section C-0a) | | | | | |

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| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 8 | Does the generator/storage facility have procedures in place to ensure that the following waste characterization parameters will be obtained :<br>• Determination whether TRU mixed waste streams comply with the applicable provisions of the TSDF-WAC<br>• Determination whether TRU mixed wastes exhibit a hazardous characteristic per 20.4.1.200 NMAC (incorporating 40 CFR 261 Subpart C)<br>• Determination whether TRU mixed wastes are listed per 20.4.1.200 NMAC (incorporating 40 CFR 261 Subpart D)<br>• Estimation of waste material parameter weights<br>(Section C-2) | | | | | |
| 9 | Are procedures in place to ensure that waste streams identified to contain incompatible materials or materials incompatible with waste containers cannot be shipped unless treated to remove the incompatibility? (Section C-1c) | | | | | |
| 10 | Are procedures in place to ensure that the generator/storage site uses acceptable knowledge and, as necessary~~, headspace-gas sampling and analysis,~~ radiography~~,~~ and visual examination~~, and homogeneous waste sampling and~~ analysis as specified in Table C-~~5~~1?<br>(Section C-3) | | | | | |

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| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Unacceptable Waste** | | | | | |
| 12 | Are procedures in place to ensure that the generator/storage site ensures, through administrative and operational procedures and characterization techniques, that waste containers do not include the following unacceptable waste:<br>• liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable<br>  • Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination<br>  • Internal containers with more than 60 milliliters or 3 percent by volume observable liquid, whichever is greater, are prohibited<br>  • Containers with Hazardous Waste Number U134 assigned shall have no observable liquid<br>  • 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<br>• non-radionuclide pyrophoric materials<br>• hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes)<br>• wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes<br>• wastes containing explosives or compressed gases (continued below) | | | | | |

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| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 12a | • wastes with polychlorinated biphenyls (PCBs) not authorized under an EPA PCB waste disposal authorization<br>• wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003)<br>• waste that has ever been managed as high-level waste and waste from tanks specified in Table C-~~8~~4, unless specifically approved through a Class 3 permit modification<br>• 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 wastes stream in each shipment pursuant to Permit Attachment C7<br>• any waste container from a waste stream which has not been preceded by an appropriate, certified Waste Stream Profile Form (see Section C-1d)<br>(Section C-1c) | | | | | |
| | **Waste Acceptance Control** | | | | | |
| 14 | Are procedures in place to ensure that the generator/storage site uses a Waste Stream Profile Form (WSPF) which includes, at a minimum, the information indicated on the attached WSPF found in Figure C-1 and a Characterization Information Summary (CIS) prior to waste disposal at the WIPP? (Section C-1d) | | | | | |
| 16 | Are procedures in place to ensure that additional WSPFs are provided to WIPP and NMED for waste streams or portions of waste streams that are reclassified based upon waste characterization information? (Section C-1d) | | | | | |
| 16a | Are criteria in place to determine the specific circumstances under which a WSPF is revised versus when a new WSPF is required? (Section C-1d) | | | | | |
| | **~~Laboratory Qualification~~** | | | | | |
| ~~17~~ | ~~Are procedures in place to ensure that the generator/storage site conduct analyses using laboratories that are qualified through participation in the Performance Demonstration Program (PDP) for headspace gas sampling and analysis, and PDP homogeneous waste sampling and analysis? (Section C-3a(3))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~18~~ | ~~Are procedures in place to ensure that the generator/storage sites conduct analyses using laboratories that implement the analytical methods through laboratory-documented standard operating procedures (SOPs) that ensure that analytical QAOs are met? (Section C-3a(3))~~ | | | | | |
| ~~19~~ | ~~Are procedures in place to ensure that documented laboratory QA/QC programs include the following:~~<br>~~• Facility organization~~<br>~~• List of equipment/instrumentation~~<br>~~• Operating procedures~~<br>~~• Laboratory QA/QC procedures~~<br>~~• Quality assurance review~~<br>~~• Laboratory records management~~<br>~~(Section C-4a(4))~~ | | | | | |
| | **General ~~Sampling and Analytical~~ Characterization Requirements** | | | | | |
| ~~20~~ | ~~Are procedures in place to ensure that headspace gas sampling and analysis shall be used to:~~<br>~~• Determine the types and concentrations of VOCs in the void volume of waste containers~~<br>~~• VOC constituents shall be compared to those assigned by Acceptable Knowledge~~<br>~~(Section C-3a(1))~~ | | | | | |
| ~~22~~ | ~~Are procedures in place to ensure that compounds not on the list of target analytes are reported as tentatively identified compounds (TICs) and that the TIC will be added to the target analyte list if it appears in the 20.4.1.200 NMAC (incorporating 40 CFR 261) Appendix VIII list and if they are reported in 25% of the waste containers sampled from a given waste stream? (Section C-3a(1))~~ | | | | | |

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| ~~23~~ | ~~Are procedures in place to ensure that a randomly selected set of samples will be collected through core sampling or other EPA approved sampling from the population of waste containers for homogeneous and soil/gravel waste streams? Are procedures in place that a sufficient number of samples are collected to evaluate the toxicity characteristic of a waste stream at a 90 percent Upper Confidence limit as specified in Attachment C2? (Section C-3a(2))~~ | | | | | |
| ~~24~~ | ~~Are procedures in place to ensure that total analyses or TCLP of VOCs, SVOCs, and RCRA-regulated metals are performed on all core samples to determine if the waste exhibits a toxicity characteristic? (Section C-3a(2))~~ | | | | | |
| 25 | Are procedures in place to ensure that Acceptable Knowledge is used in waste characterization activities to delineate TRU mixed waste streams, to assess whether TRU mixed wastes comply with the TSDF-WAC, to assess whether TRU mixed waste exhibits a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR 261 Subpart C), and to assess whether TRU wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR 261 Subpart D), and to estimate waste material parameter weights? (Section C-~~3b~~3a) | | | | | |
| 26 | Are procedures in place to ensure that radiography and/or visual examination are used as necessary to:<br>• Examine a waste container to determine the physical form<br>• Identify observable liquid in excess of TSDF-WAC limits and containerized gases<br>• Verify the physical form matches the waste stream description<br>(Section C-~~3c~~3b) | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~27~~ | ~~Are procedures in place to ensure that the following characterization activities shall occur for newly generated wastes:~~<br>~~• Acceptable Knowledge for all wastes, with sampling and analysis as necessary to augment AK including; :~~<br>~~- Either visual examination during packaging or radiography (or VE in lieu of radiography) after packaging for all waste containers, ensuring this occurs prior to any treatment designed to supercompact waste~~<br>~~- Headspace gas analysis for randomly selected containers , except for qualifying waste containers belonging to LANL sealed sources waste streams~~<br>~~- Total VOC, SVOC, and Metals analyses for a selected number of homogeneous solids and soil/gravel waste containers as specified in Attachment C2~~<br>~~- Evaluation of any TICs found in headspace gas and totals analyses~~<br>~~(Section C-3d(1))~~ | | | | | |
| ~~27a~~ | ~~Are procedures in place to ensure that the visual examination during packaging for all waste containers includes the documentation of packaging configuration, type and number of filters, and rigid liner vent hole presence and diameter necessary to determine the appropriate DAC in accordance with Permit Attachment C1, Section C1-1?~~<br>~~(Section C-3d(1))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 28 | Are procedures in place to ensure that the following characterization activities shall occur ~~for retrievably stored wastes~~:<br>• Acceptable Knowledge for all wastes, with ~~sampling and analysis~~testing as necessary to augment AK including;<br>- Visual examination or radiography for all waste containers<br>~~- Headspace gas analysis for randomly selected containers except for qualifying waste containers belonging to LANL sealed sources waste streams~~<br>~~- Total VOC, SVOC, and Metals analyses for a statistically selected number of homogeneous solids and soil/gravel waste containers as specified in Attachment C2~~<br>~~- Evaluation of any TICs found in headspace gas and totals analyses~~<br>~~(Section C-3d(2))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Data Generation, Verification, Validation, Documentation, and Quality Assurance** | | | | | |
| 30 | Are procedures in place to ensure that the following Data Quality Objectives are met:<br>• Use Acceptable Knowledge to delineate TRU mixed waste streams, assess whether TRU mixed wastes comply with the applicable requirements of the TSDF-WAC, assess whether TRU mixed wastes exhibit a hazardous characteristic, assess whether TRU mixed wastes are listed and to estimate waste material parameter weights<br>• ~~Use Headspace gas sampling and analysis, as necessary, to identify and quantify VOCs in waste containers to resolve the assignment of EPA hazardous waste numbers~~<br>• ~~Perform totals analyses of homogeneous solids and soils/gravel wastes to establish if the waste is hazardous based on the toxicity characteristics levels in 20.4.1.200 NMAC through a comparison of the upper confidence limits ($UCL_{90}$) of the mean concentrations to resolve the assignment of hazardous waste numbers~~<br>• Use radiography or visual examination to ~~determine~~ verify the physical form of the waste ~~form~~matches its waste stream description as determined by AK and to verify~~,~~ the absence of prohibited items~~, and additional waste characterization techniques that may be used based on Summary Category Groups~~<br>(Section C-4a(1)) | | | | | |

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| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 31 | Are procedures in place to ensure that the following Quality Assurance Objectives are adequately defined and assessed for each characterization method:<br>• Precision as a measure of the mutual agreement among multiple measurements.<br>• Accuracy as the degree of agreement between a measurement result and a true or known value.<br>• 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.<br>• Comparability is the degree to which one data set can be compared to another data set.<br>• Representativeness as an expression of the degree to which data represent characteristics of a population.<br>(Section C-4a(2)) | | | | | |
| 32 | With respect to data generation, are procedures in place to ensure that the generator/storage site's waste characterization program meets the following general requirements:<br>• ~~Analytical~~ Testing data packages and batch data reports must be reported accurately in a pre-approved format, must be maintained in permanent files, and must be traceable?<br>• All data must receive a technical review by another qualified ~~analyst~~operator?<br>(Section C3-~~10a~~4a) | | | | | |
| 33 | Are procedures in place to ensure that the generator/storage site performs validation of waste characterization data for each waste container? (Section C-4) | | | | | |
| 34 | Are procedures in place to ensure that the generator/storage site has a pre-approved format for reporting waste characterization data? (Section C-4a(~~4~~3)) | | | | | |
| 35 | Are procedures in place to ensure that the generator/storage site prepares ~~analytical,~~ testing~~, and sampling~~ batch data reports to meet the requirements of their own site-specific QAPjP and/or SOPs? (Section C-4a(~~4~~3)) | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 36 | Are procedures in place to ensure that all raw data is collected and managed at the data generation level in accordance with the following criteria:<br>• All raw data shall be signed and dated in reproducible ink by the individual collecting the data, or signed and dated using electronic signatures<br>• All data shall be recorded clearly, legibly, and accurately in field ~~and~~ records<br>• ~~laboratory records and include applicable sample identification numbers~~<br>• All changes to original data shall be lined out, initialed, and dated by the individual making the change. Original data may not be obliterated or otherwise be made unreadable<br>• All data shall be transferred and reduced from field ~~and laboratory~~ records completely and accurately<br>• All field ~~and laboratory~~ records shall be maintained as specified in Table C- ~~6~~ 2 of Attachment C<br>• Data shall be organized into standard reporting formats for reporting purposes.<br>• All electronic and video data must be stored to ensure that waste container~~, sample~~ and QC data are readily retrievable<br>(Section C3-~~410~~a) | | | | | |

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| 37 | Are procedures in place to ensure that 100 % of batch data reports are subject to independent technical review by an individual qualified to review the data who was not involved in the generation or recording of the data under review. The reviewer shall release the data through signature with an associated review checklist prior to characterization of the associated waste and shipment to the WIPP. The review shall ensure the following, as applicable:<br>• Data generation and reduction were conducted according to the methods used and reported in the proper units and significant figures<br>• Calculations have been verified by a valid calculation program, a spot check of verified calculation programs, and/or a 100 percent check of all hand calculations<br>• The data have been reviewed for transcription errors<br>• The testing~~, sampling, and analytical~~ QA documentation for BDRs is complete and includes, as applicable, raw data~~, DAC and equilibrium calculations and times~~, calculation records, ~~chain of custody forms,~~ calibration records~~, QC sample results and copies or originals of gas canister sample tags.~~<br>~~• All QC sample results are within established control limits, and if not, the data has been appropriately qualified~~<br>~~• Reporting flags were assigned correctly~~<br>~~• Sample holding times and preservation requirements were met, or exceptions documented~~<br>• Radiography tapes are reviewed on a waste container basis at a minimum of once per testing batch or once per day of operation, whichever is less frequent. The radiography tape will be reviewed against the data on the radiography form to ensure that data are complete and correct<br>~~• Field sampling records are complete~~<br>• QAOs have been met<br>(Section C3-~~10a~~4a(1)) | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 40 | Are procedures in place to ensure that 100 percent of all batch data reports receive a Site Project Manager signature release with an associated review checklist prior to characterization of the associated waste and shipment to the WIPP. This release shall ensure the following:<br>• ~~The Site Project Manager or designee shall determine the validity of the drum age criteria (**DAC**) assignment made at the data generation level based upon an assessment of the data collection and evaluation necessary to make the assignment.~~<br>• Testing batch QC checks were properly performed. Radiography data are complete and acceptable based on evidence of videotape review of one waste container per day or once per testing batch, whichever is less frequent<br>• ~~Sampling batch QC checks were properly performed, and meet the established QAOs and are within established data usability criteria~~<br>• ~~Analytical batch QC checks were properly performed and meet the established QAOs and are within established data usability criteria~~<br>• ~~Online batch QC checks were properly performed and meet the established QAOs and are within established data usability criteria~~<br>• ~~Proper procedures were followed to ensure representative samples of headspace gas and homogeneous solids and soil/gravel were taken~~<br>• Data generation level independent technical review, validation, and verification have been performed as evidenced by the completed review checklists and appropriate signature releases.<br>• Independent technical reviewers were not involved in the generation or recording of the data under review.<br>• Batch Data review checklists are complete<br>• Batch Data Reports are complete and data properly reported<br>• Verify that data are within established data assessment criteria and meet all applicable QAOs<br>(Section C3-~~10b~~4b(1)) | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 42 | Are procedures in place to ensure that a repeat of the data review process at the data generation level will be performed on a minimum of one randomly chosen waste container every quarter to determine if the verification and validation is performed according to documented procedures? (Section C3-~~10b~~4b) | | | | | |
| 43 | Are procedures in place and checklists are available to prepare a Site Project Manager (SPM) Summary and a Data Validation Summary (the summaries may be in the same document)? The SPM Summary includes a validation checklist for each batch that is of sufficient detail to document all aspects of a batch data report that could affect data quality. The Data Validation Summary must identify each Batch Data Report reviewed , describe how the validation was performed, identify all problems, and identify all acceptable and unacceptable data. Summaries must include release signatures. (Section C3-~~10b~~4b(2)) | | | | | |
| 44 | Are procedures in place to ensure that non-administrative, WAP-related nonconformances first identified at the site project manager level are reported to the Permittees within seven calendar days of identification, that nonconformance reports are prepared within 30 calendar days, and that corrective action is implemented prior to waste shipment? (Section C3-~~13~~7) | | | | | |
| 45 | Are procedures in place to ensure that any waste container for which a nonconformance report (**NCR**) has been written will not be shipped to the WIPP facility unless the condition that led to the NCR for that container is appropriately identified, reconciled, corrected, and documented? Are nonconformance reports prepared for nonconformances identified? Are nonconformances identified and tracked, and does the Site Project Manager oversee the nonconformance report process? (Section C3-~~13~~7) | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **~~Sample Control~~** | | | | | |
| ~~46~~ | ~~Are procedures in place to ensure that the site's sample handling and control program includes the following:~~<br>~~• Field documentation of samples including point of origin, date of sample, container identification, sample type, analysis requested, and chain-of-custody (COC) number?~~<br>~~• Proper labeling and/or tagging including proper sample numbering, sample identification, sample date, sampling conditions, and analysis requested?~~<br>~~• COC record including name of sample relinquisher, sample receiver, and date and time of sample transfer? and~~<br>~~• Proper sample handling and preservation?~~<br>~~(Section C-4a(3))~~ | | | | | |
| ~~47~~ | ~~Are procedures in place to ensure that the site's QAPjP or site-specific procedures includes COC forms to control the sample from the point of origin to the final analysis result reporting? (Section C-4a(3))~~ | | | | | |
| | **Data Transmittal** | | | | | |
| 48 | Are procedures in place to ensure that the generator/storage site transmits data by hard copy or electronic copy from the data generation level to the site project level? If electronic, does the generator/site have a hard copy available on demand? (Section C-4a(~~6~~5)) | | | | | |
| 50 | Are procedures in place to ensure that the generator/storage site inputs the data into the WWIS manually or electronically? (Section C-4a(~~6~~5)) | | | | | |
| 51 | Are procedures in place to ensure that the generator/storage site enters the data into the WWIS in the exact format required by the database? (Section C-4a(~~6~~5)) | | | | | |
| ~~51a~~ | ~~Are procedures in place to ensure that if a container was part of a composite headspace gas sample, the analytical results from the composite sample must be assigned as the container headspace gas data results, including associated TICs, for every waste container associated with the composite sample in the WWIS? (Section C3-12b(4))~~ | | | | | |
| 52 | Are procedures in place to ensure all of the data presented on Table C-~~7~~3 of the Permit is transmitted to the WWIS? (Table C-~~7~~3) | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Records and Record Management** | | | | | |
| 55 | Are procedures in place to ensure that the generator/storage site's hard copy and/or electronic data reports follow the Permittees' format requirements? (Section C-4a(~~4~~3)) | | | | | |
| 56 | Are procedures in place to ensure that hard copy or electronic Waste Stream Profile Form will include the following<br>• Generator/storage site name<br>• Generator/storage site EPA ID<br>• Date of audit report approval by NMED (if obtained)<br>• Original generator of waste stream<br>• Whether waste is Contact-Handled or Remote-Handled<br>• Waste Stream WIPP Identification Number<br>• Summary Category Group<br>• Waste Matrix Code Group<br>• Waste Material Parameter Weight Estimates per unit of waste<br>• Waste stream name<br>• A description of the waste stream<br>• Applicable EPA hazardous waste numbers<br>• Applicable TRUCON codes<br>• A listing of acceptable knowledge documentation used to identify the waste stream<br>• The waste characterization procedures used and the reference and date of the procedure<br>• Certification signature of Site Project Manager, name, title, and date signed<br>(Section C3-~~12b~~6b(1)) | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 56a | Are procedures in place to ensure that hard copy or electronic Characterization Information Summary will include the following:<br>• Data reconciliation with DQOs<br>• ~~Headspace gas summary data listing the identification numbers of samples used in the statistical reduction, the maximum, mean, standard deviation, $UCL_{90}$, RTL, and associated EPA hazardous waste numbers that must be applied to the waste stream.~~<br>• ~~Total metal, VOC, and SVOC analytical results for homogeneous solids and soil/gravel (if applicable),~~<br>• ~~TIC listing and evaluation,~~<br>• Radiography and visual examination summary to document that all prohibited items are absent in the waste and to verify that the physical form of the waste matches its waste stream description as determined by AK (if applicable).<br>• A complete listing of all container identification numbers used to generate the Waste Stream Profile Form, cross-referenced to each Batch Data Report<br>• Complete AK summary, including stream name and number, point of generation, waste stream volume (current and projected), generation dates, TRUCON codes, Summary Category Group, Waste Matrix Code(s) and Waste Matrix Code Group, other TWBIR information, waste stream description, areas of operation, generating processes, RCRA determinations, radionuclide information, all references used to generate the AK summary, and any other information required by Permit Attachment C4, Section C4-2b.<br>• Method for determining Waste Material Parameter Weights per unit of waste.<br>• List of any AK Sufficiency Determinations requested for the waste stream.<br>• Certification through acceptable knowledge or testing ~~and/or analysis~~ that any waste assigned the hazardous waste number of U134 (hydrofluoric acid) no longer exhibits the characteristic of corrosivity. This is verified by ensuring that no liquid is present in U134 waste.<br>• A justification for the selection of radiography and/or VE as an appropriate method of characterizing the waste.<br>(Section C3-~~12b~~6b(2)) | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 56b | Are procedures in place to assure that ongoing container characterization results are cross referenced to Batch Data Reports? Section C3-~~12b~~6b | | | | | |
| 58 | Are procedures in place to ensure that project level reports are compiled into Characterization Information Summaries (Section C3-~~612~~b) | | | | | |
| 59 | Are procedures in place to ensure that the generator/storage site uses forms for data reporting that are pre-approved forms in site-specific documentation? (Section C3-~~12~~6) | | | | | |
| 60 | Are procedures in place to ensure that the generator/storage site's site project manager submits to the WIPP facility a summary of the waste stream information and reconciliation with data quality objectives (DQOs) once a waste stream is characterized? (Section C-4a(~~6~~5)) | | | | | |
| 61 | Are procedures in place to ensure that the generator/storage site project office completes a WSPF based on the Batch Data Reports? C3-~~12b~~6b) | | | | | |
| 62 | Are procedures in place to ensure that the generator/storage Site Project Manager submits the WSPF to the Permittees for DOE's approval along with the accompanying Characterization Information Summary for that waste stream? (Section C-4a(~~6~~5)) | | | | | |
| 63 | Are procedures in place to ensure that the generator/storage site maintains records related to waste characterization ~~sampling and analysis~~testing activities in the testing~~, sampling or analytical~~ facility~~ies~~ files, or site project files for those facilities located on-site? (Section C-4a(~~7~~6)) | | | | | |
| 64 | Are procedures in place to ensure that the appropriate documented training and indoctrination is performed for all individuals and that procedures are documented in site specific QAPjPs and procedures? (Section C3-~~14~~8) | | | | | |
| ~~65~~ | ~~Are procedures in place to ensure that the generator/storage site requires contract waste analytical facilities to forward testing, sampling and analytical records along with testing, sampling and analytical batch data reports to the site project office for inclusion in the sites project files? (Section C-4a(7))~~ | | | | | |
| 66 | Are procedures in place to ensure that the generator/storage site has an appropriate records inventory and disposition schedule (RIDS) or equivalent that was prepared and approved by appropriate site personnel? (Section C-4a(~~6~~7)) | | | | | |

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|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 67 | Are procedures in place to ensure that the generator/storage site maintains all records relevant to an enforcement action, regardless of disposition, until they are no longer needed for enforcement action, and then dispositioned per the approved RIDS? (Section C-4a(~~7~~6)) | | | | | |
| 68 | Are procedures in place to ensure that the generator/storage site maintains records that are designated as Lifetime Records for the life of the waste characterization program plus six years, or that the records have been transferred for permanent archival storage to the WIPP Records Archive facility? Lifetime Records include:<br>• ~~Field sampling data forms,~~<br>• ~~Field and laboratory COC forms,~~<br>• Test facility ~~and laboratory~~ Batch Data Reports,<br>• Waste Stream Characterization Package,<br>• ~~Sampling plans,~~<br>• Data reduction, validation, and reporting documentation,<br>• Acceptable knowledge documentation,<br>• WSPF and Characterization Information Summary<br>(Section C-4a(~~7~~6), Table C-~~6~~2) | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 69 | Are procedures in place to ensure that the generator/storage site maintains records that are designated as Non-Permanent Records for ten years from the date of record generation, and then dispositioned according per the approved RIDS or transferred to the WIPP Records Archive facility?<br>Non-Permanent Records include:<br>• Nonconformance documentation,<br>• Variance documentation,<br>• Assessment documentation,<br>• ~~Gas canister tags,~~<br>• ~~Methods performance documentation,~~<br>• ~~PDP documentation,~~<br>• ~~Sampling equipment certifications,~~<br>• Calculations and related software documentation,<br>• Training/qualification documentation,<br>• QAPjP documentation (all revisions),<br>• Calibration documentation,<br>• ~~Analytical raw data,~~<br>• Procurement documentation,<br>• QA procedures (all revisions),<br>• Technical implementing procedures (all revisions), and<br>• Audio/video recording (radiography, visual, etc.).<br>(Section C-4a(~~7~~6), Table C-~~6~~2) | | | | | |
| 70 | Are procedures in place to ensure that the generator/storage site has raw data that is identifiable and legible, and provides documentary evidence of quality? (Section C-4a(~~7~~6)) | | | | | |
| 71 | Are procedures in place to ensure that if the generator/storage site ceases to operate, that all records be transferred before closeout? (Section C-4a(~~7~~6)) | | | | | |

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|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Shipment** | | | | | |
| 72 | Are procedures in place to ensure that the generator/storage site accurately completes an EPA Hazardous Waste Manifest prior to shipping the waste to WIPP that contains the following information:<br>• Generator/storage site name and EPA ID<br>• Generator/storage site contact name and phone number<br>• Quantity of waste<br>• List of up to six state and/or federal hazardous waste numbers in each line item<br>• Listing of all container IDS<br>• Signature of authorized generator representative<br>(Section C-5b) | | | | | |
| 73 | Are procedures in place to ensure that the generator/storage site accurately completes the following container specific information:<br>• Waste stream identification number<br>• List of hazardous waste numbers per container<br>• Certification data<br>• Shipping data<br>(Section C-5b) | | | | | |

1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to ask whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met

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**~~Table C6-2 – Solids and Soils/Gravel Sampling Checklist~~**

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1 ~~**Solids and Soils/Gravel Sampling Checklist**~~

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | ~~**General Solids Sampling Requirements**~~ | | | | | |
| ~~75~~ | ~~Are procedures documented that adequately ensure that when a Determination Request has not been approved, sampling and analysis of newly generated homogeneous solid and soil/gravel waste streams shall be conducted in accordance with the requirements specified in Attachment C1, Section C1-2.~~ ~~(Section C-3d(1)(a))~~ | | | | | |
| ~~76~~ | ~~Are procedures in place to ensure that the number of newly generated soils/gravel waste containers to be randomly sampled will be determined using the procedure specified in Section C2-1, wherein a statistically selected portion of the waste will be sampled? (Section C-3d(1)(a))~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~77~~ | ~~Are procedures in place to ensure that the following sample collection requirements for retrievably stored and newly generated waste streams are met:~~<br>~~• The number of random samples collected for characterization of retrievably homogeneous solid and soil/gravel stored waste is performed by developing preliminary mean and variance estimates for each analyte to define the number of required random samples; and that the sample selection process is adequately documented.~~<br>~~• A minimum of 5 waste containers in a retrievably stored waste streams are sampled to establish the preliminary estimate for the number of samples.~~<br>~~• Based on the number of samples required by the preliminary estimate, the subsequent sample means and deviations for each analyte are evaluated against the regulatory threshold for each constituent to determine if additional samples shall be collected.~~<br>~~• Samples (the number of which is statistically determined) are collected to verify that a TRU mixed waste is below the regulatory threshold, where the regulatory threshold is the toxicity limit for toxicity characteristics and the PRQL for listed waste constituents.~~<br>~~• Samples from preliminary estimates counted as required samples were randomly selected and were collected, analyzed, and validated using representative methods~~<br>~~(Section C2-1a)~~ | | | | | |
| ~~80~~ | ~~Are procedures in place that allow toxicity characteristic contaminants associated with F-numbers for a waste stream to be omitted from sampling requirements? (Section C2-1a)~~ | | | | | |
| | ~~**Solids Sampling Procedures**~~ | | | | | |
| ~~81~~ | ~~Do procedures ensure that samples for retrievably stored waste are collected using appropriate coring tools or other EPA approved methods, and that newly generated wastes that are sampled from a process as it is generated are sampled using EPA approved methods, including scoops and ladles, that are capable of collecting a representative sample? (Section C1-2a)~~ | | | | | |

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|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~82~~ | ~~Do site specific procedures, QAPjPs, and/or SOPs indicate that rotational coring tools are available for the collection of cores and non-rotational coring tools available for collection of cores in relatively soft media. The method used shall be appropriate to retrieve the maximum core amount. The coring tools will include the following features:~~<br>• ~~Removable tube liners constructed of rigid materials unlikely to affect the composition and/or concentration of target analytes in the sample core (Teflon®) and sufficiently transparent to allow visual examination of the core. The liner outer diameters are between 1-2 inches and the liner wall thickness is no greater than 1/16 inch. The liner shall fit flush with the coring tool inner wall and be of sufficient length to hold a core representative of the waste along the entire depth of the waste.~~<br>• ~~Sleeves composed of polycarbonate, Teflon, or glass for most samples and brass or stainless steel for non-metal samples~~<br>• ~~Liner end caps shall fit tightly around the ends of the liner and shall be composed of materials unlikely to affect the composition and/or concentration of analytes in the core (Teflon®)~~<br>• ~~Spring retainers shall be used when the physical properties of the sampling media may cause the sample to fall out of the liner. The retainer shall be composed of inert materials and the inner diameter shall not be less than the inner diameter of the liner~~<br>• ~~Coring tools may have an air lock mechanism. The air lock shall also close when the core is removed from the waste container~~<br>• ~~Core extruders shall be used to extrude the liner if the liner does not slide freely~~<br>• ~~Coring tools shall be of sufficient length to hold the liner and shall be constructed to allow placement of the liner leading edge as close as possible to the coring tools leading edge~~ | | | | | |

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|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~82a~~ | ~~• All surfaces of the coring tool that have the potential to contact the sample core or sample media shall be cleaned prior to use~~<br>~~• Rotational coring tools shall have a mechanism to minimize inner liner rotation and shall be designed to minimize frictional heat transfer to the sample core~~<br>~~• The leading edge of the coring tool may be sharpened and tapered to a diameter equivalent or slightly smaller than the inner diameter of the liner.~~<br>~~• Non-Rotational coring tools shall be designed to minimize the kerf width (½ the difference between the outer diameter of the tool and the tools inlet inner diameter)~~<br>~~(Section C1-2a(1))~~ | | | | | |
| ~~83~~ | ~~Does the site adequately document that the liner material and retainers are not likely to contain any analytes of concern? (Section C1-2a(1))~~ | | | | | |
| ~~84~~ | ~~Are procedures in place to ensure that equipment blanks are collected and evaluated to verify that liner material, retainers, or other sampling equipment in contact with the sample do not contain analytes of concern? (Section C1-2b(2))~~ | | | | | |
| | ~~**Sample Collection**~~ | | | | | |
| ~~85~~ | ~~Are procedures in place to ensure that sampling is completed in a timely manner, within 60 minutes of core collection, or that the core shall remain in the capped liner, or the coring tool shall remain in the waste container with the air lock mechanism attached? (Section C1-2a(2))~~ | | | | | |
| ~~86~~ | ~~Are procedures in place to ensure that VOC samples are sampled prior to extruding the core from the liner and that the sample locations are documented? These samples may be collected by choosing a single sample from the representative subsection of the core, or three equal length VOC sample locations on the core are selected randomly along the long axis of the core to form a single 15-gram composite sample. Smaller sample sizes may be used if method PRQL requirements are met for all analytes. (Section C1-2a(2))~~ | | | | | |
| ~~87~~ | ~~Are procedures documented to ensure that a VOC sample is collected using a metal coring cylinder or equivalent equipment as described in SW-846 and that the sample is immediately extruded into a 40 mL VOA vial (or other containers specified in appropriate SW-846 methods)? (Section C1-2a(2))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~88~~ | ~~Are procedures in place to ensure that SVOC and Metals sample location(s) on the core are selected randomly along the long axis of the core and that the sample locations are documented, or that samples are collected at the same locations as VOC samples? Samples may be collected by splitting or compositing the representative subsection of the core. The representative subsections are chosen by randomly selecting a location along the portion of the core from which the sample was taken. (Section C1-2a(2))~~ | | | | | |
| ~~89~~ | ~~Are procedures in place to ensure that the SVOC and Metals sample s are collected using equipment constructed of materials unlikely to affect the composition or concentrations of the samples? (Section C1-2a(2))~~ | | | | | |
| ~~90~~ | ~~Are procedures in place to ensure that newly generated waste samples collected by means other than coring are collected as soon as possible and that spatial and temporal homogeneity is evaluated to determine if composite or grab samples are appropriate? (Section C1-2a(2))~~ | | | | | |
| ~~91~~ | ~~Are procedures in place to ensure sample volumes, preservatives, containers, and holding times meet the following specifications:~~<br>~~**Minimum sample quantity**~~<br>~~VOC – 15 grams~~<br>~~SVOC – 50 grams~~<br>~~Metals – 10 grams~~<br>~~(Quantity may be increased or decreased according to the requirements of the analytical laboratory, as long as the QAOs are met.)~~<br>~~**Preservative**~~<br>~~VOC – Cool to 4C~~<br>~~SVOC – Cool to 4C~~<br>~~Metals – Cool to 4C~~<br>~~**Sample Container**~~<br>~~VOC – 40 mL VOA glass vial (or other appropriate containers) cap~~<br>~~SVOC – glass jar with Teflon© lined cap~~<br>~~Metals – polyethylene or polypropylene bottle~~<br>~~**Holding Time from Date of Collection**~~<br>~~VOC – 14 days prep/40 days analyze~~<br>~~SVOC – 14 days prep/40 days analyze~~<br>~~Metals – 180 days/ 28 days Hg~~<br>~~(Table C1-4)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | ~~**Quality Control Sample Collection**~~ | | | | | |
| ~~92~~ | ~~Are procedures in place to ensure that sampling precision will be determined through the collection of co-located core field duplicate samples for core samples and through the collection of co-located samples for samples collected using alternate methods at the frequency of once per 20 sample batch collected over 14 days or once per week, whichever is more frequent? (Section C1-2b(1))~~ | | | | | |
| ~~93~~ | ~~Are procedures in place to ensure that co-located cores are collected side by side as close as feasible to each other, that the cores are collected and handled in the same manner? (Section C1-2b(1))~~ | | | | | |
| ~~94~~ | ~~Are procedures in place to ensure that an additional sampling location is found or new co-located cores are collected if the visual examination of the original co-located cores detects inconsistency in the sample color, texture, or waste type? (Section C1-2b(1))~~ | | | | | |
| ~~95~~ | ~~Are procedures in place to ensure that all surfaces of sampling tools that have the potential to come into contact with the sample, including tube liners, endcaps, spring retainers, extruders, coring tool surfaces, or any other sampling equipment, are either thoroughly decontaminated or disposed of after each sampling event? (Sections C1-2b(2), C1-2b(3))~~ | | | | | |
| ~~96~~ | ~~Are procedures in place to ensure that equipment blanks are collected from randomly selected fully assembled coring tools or randomly selected liners (if they are cleaned separately) and from randomly selected sampling equipment (e.g. VOC subsampler, spoons, bowls) at a frequency of once per equipment cleaning batch and that the sample is collected prior to first use? (Section C1-2b(2))~~ | | | | | |
| ~~97~~ | ~~Are procedures in place to ensure that equipment blanks will be collected in the area where sampling equipment coring tools are cleaned, prior to covering the coring tools with protective wrapping and storage? (Section C1-2b(2))~~ | | | | | |
| ~~99~~ | ~~Are procedures in place to ensure that miscellaneous sampling tool equipment blanks will be collected by pouring deionized or HPLC water over the surface of the equipment and into a clean sample container appropriate for the requested analysis? (Section C1-2b(2))~~ | | | | | |

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| ~~100~~ | ~~Are procedures in place to ensure that equipment blanks are analyzed for VOC, SVOC, and Metals and that the entire equipment batch will be re-cleaned and re-sampled if any analytes are detected at levels greater than 3 times the MDL or PRDL (Section C1-2b(2))~~ | | | | | |
| ~~101~~ | ~~Are procedures and processes in place to ensure that equipment blanks are traceable to a specific equipment cleaning batch and that the equipment cleaning batch is traceable to specific identified sampling equipment? Are sampling equipment or coring tools labeled with unique identification numbers that are referenced in field records? (Section C1-2b(3))~~ | | | | | |
| ~~102~~ | ~~Are procedures in place to ensure that disposable sampling equipment is certified as clean prior to use? (Section C1-2b(2))~~ | | | | | |
| | ~~**Sample Equipment Testing, Inspection and Maintenance**~~ | | | | | |
| ~~103~~ | ~~Are procedures in place to ensure that all sampling and coring tools are tested prior to use in accordance with manufacturers specification to ensure that the air-lock mechanism and rotation mechanism are in working order? (Section C1-2c)~~ | | | | | |
| ~~104~~ | ~~Are procedures in place to ensure that malfunctioning sampling and coring tools are repaired or replaced prior to use? (Section C1-2c)~~ | | | | | |
| ~~105~~ | ~~Are procedures in place to ensure that all equipment is cleaned, sealed inside a protective wrapping and stored in a clean area? (Section C1-2c)~~ | | | | | |
| ~~106~~ | ~~Are procedures in place to ensure that an adequate spare part inventory is available? (Section C1-2c)~~ | | | | | |
| ~~107~~ | ~~Are procedures in place to ensure that all equipment maintenance and repair is documented in field records and that field record logbooks are available to document equipment maintenance and repair activities? (Section C1-2c)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~108~~ | ~~Are procedures in place to ensure that inspection of equipment and work area cleanliness will encompass the following:~~<br>• ~~Sample collection equipment in the immediate area of sample collection shall be inspected daily for cleanliness and that any visible contamination that has a potential to contaminate a waste sample shall be thoroughly cleaned upon discovery~~<br>• ~~The waste coring and sampling work areas shall be maintained in clean condition~~<br>• ~~Expendable equipment shall be visually inspected for cleanliness prior to use and properly discarded after use~~<br>• ~~Protective wrapping on coring tools and other sampling equipment are visually inspected prior to unwrapping. Coring tools or other equipment with torn protective wrappers or with visible contamination are returned to be cleaned or properly discarded prior to use.~~<br>• ~~All sampling equipment shall be visually inspected prior to use to determine if protective wrapping is torn or if equipment is contaminated after unwrapping. Equipment with torn wrapping or signs of contamination will be returned for cleaning or properly discarded.~~<br>• ~~Clean sampling and coring equipment is segregated from all equipment that has not been decontaminated.~~<br>~~(Section C1-2c)~~ | | | | | |
| ~~109~~ | ~~Are procedures documented to ensure that scales used for weighing sub-samples are calibrated as necessary to maintain its operation within manufacturer's specification, that the calibration is documented, that calibration is verified using NIST traceable weights upon each day of use, and that all calibration verification is documented in field records? (Section C1-2d)~~ | | | | | |

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|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | ~~**Sample Handling and Custody**~~ | | | | | |
| ~~111~~ | ~~Do formats for field logs and custody records specify documentation of the following information:~~<br>• ~~Signature of individual initiating custody control, along with the date and time~~<br>• ~~Documentation of sample numbers for each sample under custody. Sample numbers will be referenced to a specific sampling event description that will identify the sampler(s) through signature, date and time of sample collection, type/number containers for each sample, sample matrix, preservatives (if applicable), requested methods of analysis, place/address of sample collection and the waste container number~~<br>• ~~For off-site shipping, method of shipping transfer, responsible shipping organization or corporation, and associated air bill or lading number.~~ | | | | | |
| ~~111a~~ | • ~~Signatures of custodians relinquishing and receiving custody of samples including date and time of transfer.~~<br>• ~~Description of final sample container disposition, along with signature of individual removing sample container from custody~~<br>• ~~Comments section~~<br>• ~~Documentation of discrepancies, breakage or tampering~~<br>~~(Section C1-5)~~ | | | | | |
| ~~112~~ | ~~Are procedures in place to ensure that samples and sampling equipment are identified with unique identification numbers? (Section C1-5)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~113~~ | ~~Do sample tags or labels contain the following information:~~<br>~~• Sample ID number~~<br>~~• Sampler initials and organization~~<br>~~• Ambient temperature and pressure (for gas samples only)~~<br>~~• Sample description~~<br>~~• Requested analysis~~<br>~~• Date and time of collection~~<br>~~• QC designation (if applicable)~~<br>~~(Section C1-5)~~ | | | | | |
| ~~114~~ | ~~Are procedures in place to ensure waste containers and samples are sealed with intact custody seals and that one or more of the following custody conditions are met:~~<br>~~• It is in the possession of an authorized individual~~<br>~~• It is in the view of an authorized individual, after being in the possession of that individual~~<br>~~• It was in the possession of an authorized individual and access to the sample was controlled by locking or placement of signed custody seals that prevent undetected access~~<br>~~• It is in a designated secure area, such as a controlled access location with complete documentation of personnel access or a radiological containment area (hot cell or glove box)~~<br>~~(Section C1-5)~~ | | | | | |
| ~~117~~ | ~~Are procedures in place to ensure that sample custody is maintained until the sample is released by the SPM or is expended. (Section C1-5)~~ | | | | | |
| ~~118~~ | ~~Are procedures in place to ensure that samples in glass jars are wrapped in plastic to prevent breakage and placed in appropriate containers, such as coolers, for shipment? (Section C1-6)~~ | | | | | |
| ~~119~~ | ~~Are procedures in place to ensure that adequate cold packs are included in the sample shipping container to ensure that all temperature requirements are met? (Section C1-6)~~ | | | | | |

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| ~~120~~ | ~~Are procedures in place to ensure that sample COC forms are secured for shipment to the inside of the sealed and locked shipping container and that samples and shipping containers are affixed with tamper proof seals? (Section C1-6)~~ | | | | | |
| ~~121~~ | ~~Are procedures in place to ensure that appropriate blank samples are included with each shipment container containing VOC samples? (Section C1-6)~~ | | | | | |
| ~~122~~ | ~~Are procedures in place to ensure that a custody seal or device is securely affixed across the lid and body of each sample and shipment container, and is traceable to the individual who affixed the seal or device? (Section C1-5)~~ | | | | | |
| | ~~**Laboratory Operations**~~ | | | | | |
| ~~123~~ | ~~Are procedures in place to ensure that only laboratories that are qualified through participation in the Performance Demonstration Program are eligible to analyze waste samples? (Section C-3a(3))~~ | | | | | |
| ~~124~~ | ~~Are procedures available from all participating laboratories that adequately document that custody is maintained until the sample is released by the site project manager or until the sample is expended? (Section C1-5)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | ~~**Volatile and Semi-Volatile Analysis of Core Samples**~~ | | | | | |
| ~~125~~ | ~~Are procedures documented to ensure that all VOC and SVOC analyses are evaluated using the following criteria:~~<br>~~• GC/MS Tunes, Initial Calibrations and Continuing Calibration will be performed and evaluated using criteria in Table C3-5 (VOCs) or Table C3-7 (SVOCs) and SW-846 methods~~<br>~~• Precision shall be assessed through analyzing laboratory duplicates or matrix spike duplicates, LCS replicates, and PDP blind-audit samples in comparison to Table C3-4 (VOCs) and Table C3-6 (SVOCs)~~<br>~~• Accuracy as %R shall be assessed through evaluation of LCS , Matrix spikes, PDP blind-audit samples, and surrogate compounds in comparison to criteria in Table C3-4 and Table C3-5 (VOCs) and Table C3-6 and Table C3-7(SVOCs) or the SW-846 method.~~<br>~~• Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples collected.~~<br>~~• Comparability is assessed through use of standardized SW-846 methods sample preparation and methods that meet the QAO requirements in Tables C3-4 and C3-5 (VOCs) and Tables C3-6 and C3-7(SVOCs), traceable standards, and by requiring participation in the PDP.~~<br>~~• Representativeness is assured through the use of unbiased sample collection~~<br>~~• Results and method detection limits are expressed in Mg/Kg~~<br>~~• All method detection limits and program required quantitation limits shall be less than or equal to the limits listed in Table C3-4 or Table C3-6 and the detection limit study procedures shall be documented in SOPs~~<br>~~(Section C3-6 and C3-7)~~ | | | | | |
| ~~126~~ | ~~Are procedures documented to ensure that Tentatively Identified Compounds shall be added to the target analyte list if detected in a given waste stream if they are reported in 25% of the waste containers sampled from a given waste stream, and if they appear in the 20.4.1.200 NMAC (incorporating 40 CFR §261) Appendix VIII list? (Section C-3a(1))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~126a~~ | ~~Are procedures documented to ensure that the following criteria are met with regard to the recognition and reporting of TICS for GC/MS Methods for homogeneous solids and soils and gravels in accordance with SW-846 criteria:~~<br>• ~~Relative intensities of major ions in the reference spectrum (ions greater than 10% of the most abundant ion) should be present in the sample spectrum.~~<br>• ~~The relative intensities of the major ions should agree within ± 20 percent.~~<br>• ~~Molecular ions present in the reference spectrum should be present in the sample spectrum.~~<br>• ~~Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.~~<br>• ~~Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks.~~<br>• ~~The reference spectra used for identifying TICs shall include, at minimum, all of the available spectra for compounds that appear in the 20.4.1.200 NMAC (incorporating 40 CFR Part 261) Appendix VIII list. The reference spectra may be limited to VOCs when analyzing headspace gas samples.~~<br>• ~~TICs for headspace gas analyses that are performed through FTIR analyses shall be identified in accordance with the specifications of SW-846 Method 8410.~~<br>~~(Section C3-1)~~ | | | | | |

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| ~~126b~~ | ~~TICs shall be reported as part of the analytical batch data reports for GC/MS Methods in accordance with the following minimum criteria:~~<br>• ~~a TIC in an individual container headspace gas or solids sample shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 10% of the area of the nearest internal standard.~~<br>• ~~a TIC in a composited headspace gas sample that contains 2 to 5 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 2% of the area of the nearest internal standard.~~<br>• ~~a TIC in a composited headspace gas sample that contains 6 to 10 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 1% of the area of the nearest internal standard.~~<br>• ~~a TIC in a composited headspace gas sample that contains 11 to 20 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 0.5% of the area of the nearest internal standard.~~<br>~~(Section C3-1)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | ~~**Metals Analysis of Core Samples**~~ | | | | | |
| ~~127~~ | ~~Are procedures in place to ensure that all Metals analyses are evaluated using the following criteria:~~<br>• ~~Precision shall be assessed by analyzing of laboratory sample duplicates or laboratory matrix spike duplicates, LCS replicates, and PDP blind audit samples in comparison to Table C3-8~~<br>• ~~Accuracy shall be assessed through analysis of laboratory matrix spikes, PDP blind-audit samples, serial dilutions, interference check samples, and laboratory control samples in comparison to criteria in Tables C3-8 and C3-9~~<br>• ~~Instrument detection limits are expressed in ug/L and results are listed in Mg/Kg.~~<br>• ~~All instrument detection limits and program required detection limits shall be less than the limits listed in Table C3-8 and the detection limit study procedures shall be documented in laboratory SOPs. The Instrument detection limits shall be less than the associated PRDL for each analyte *(This requirement is not mandatory if the sample concentrations are greater than 5 times the instrument detection limit (IDL) for a method)*~~<br>• ~~Instrument detection limits shall be determined semiannually using procedures documented in laboratory SOPs~~ | | | | | |
| ~~127a~~ | • ~~Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis.~~<br>• ~~Comparability is assessed through use of standardized SW-846 sample preparation and methods that meet the QAO requirements in Tables C3-8 and C3-9, demonstrating successful participation in the PDP and use of traceable standards.~~<br>• ~~Representativeness is assured through the use of unbiased sample collection and preparation of samples using unbiased methods.~~<br>• ~~Results PRQLs are expressed in Mg/Kg wet weight~~<br>~~(Section C3-8)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | ~~Quality Assurance Objectives~~ | | | | | |
| ~~128~~ | ~~Are procedures in place to ensure that the sample completeness rate is expressed as the number of valid samples collected as a percentage of the total samples collected for each waste stream? The rate must be greater than 90 percent for all compounds in a waste stream. (Section C3-3)~~ | | | | | |
| ~~129~~ | ~~Are procedures in place to ensure that sampling operations are comparable through the use of standardized procedures, sampling equipment, and measurement units participation in the PDP? (Section C3-3)~~ | | | | | |
| ~~130~~ | ~~Are procedures in place to ensure that sampling precision shall be determined through the collection of field duplicates at a rate of 1 per sampling batch (up to 20 samples) or 1 per week, whichever is more frequent? (Section C3-3)~~ | | | | | |
| ~~131~~ | ~~Are procedures in place to ensure that the variance measured between co-located core samples is compared to the variance within the waste stream using the F-test? (Section C3-3)~~ | | | | | |
| ~~132~~ | ~~Are procedures in place to ensure that sampling accuracy as a result of equipment blank evaluation is determined through the collection of equipment blanks at a frequency of once per equipment cleaning batch (Section C3-3)~~ | | | | | |

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|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~133~~ | ~~Are procedures in place to ensure that the representativeness of samples is demonstrated through the following requirements:~~<br>~~• Use of coring tools and sampling equipment that are clean prior to use~~<br>~~• The entire depth of the waste minus a documented safety factor shall be cored and the core collected shall have a core length greater than or equal to 50 percent~~<br>~~• The core recovery is calculated as the length of the core collected over the depth of the waste in the container~~<br>~~• Coring operations and tools should be designed to minimize alteration of the in-place waste characteristics and the minimum waste disturbance shall be verified by visually examining the core and documenting the observation in field logbooks~~<br>~~(Note: if core recovery is less than 50 percent, a second core shall be randomly selected. The core with the best recovery shall be used for sample collection)~~<br>~~(Section C3-3)~~ | | | | | |

~~1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.~~

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~~**Table C6-3 Acceptable Knowledge (AK) Checklist**~~

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1 **Table C6-2 Acceptable Knowledge (AK) Checklist[1]**

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **General Requirements** | | | | | |
| 134 | Are the primary document(s) required in Permit Attachment C4 containing acceptable knowledge information available? (Section C4-2) | | | | | |
| 135 | Has the generator developed a methodology whereby a logical sequence of acceptable knowledge information that progresses from general facility to more detailed waste-specific information can be acquired? (Section C4-2) | | | | | |
| 136 | Does the site have adequate procedures in place to ensure that the Acceptable Knowledge process is adequately implemented? Do these procedures facilitate the mandatory traceability analysis performed for each Summary Waste Category Group examined during the audit? (Section C4-2) | | | | | |
| 137 | Does the generator site's TRU mixed waste management program information clearly define (or provide a methodology for defining) waste categorization schemes and terminology, provide a breakdown of the types and quantities of TRU mixed waste generated/stored at the site, and describe how waste is tracked and managed at the generator site (including historical and current operations? Do procedures ensure that waste streams are adequately identified? (Section C4-2a) | | | | | |
| 138 | Does site documentation procedures indicate that the site will document, justify, and consistently define waste streams and assign EPA hazardous waste numbers? (Section C4-2b) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Required and Additional Information** | | | | | |
| 140 | Does the generator site document that the following must be included in the acceptable knowledge record:<br>• Map of the site with the areas and facilities involved in TRU waste generation, treatment, and storage identified<br>• Facility mission description as related to TRU waste generation and management (e.g., nuclear weapons research may involve metallurgy, radiochemistry, and nuclear physics operations that result in specific waste streams)<br>• Description of the operations that generate TRU waste at the site (e.g., plutonium recovery, weapons design, or weapons fabrication)<br>• Waste identification or categorization schemes used at the facility (e.g., item description codes, content codes)<br>• Types and quantities of TRU mixed waste generated, including historical generation through future projections<br>• Correlation of waste streams generated from the same building and process, as appropriate (e.g., sludge, combustibles, metals, and glass)<br>• Waste certification procedures for retrievably stored and newly generated wastes to be sent to the WIPP facility<br>(Section C4-2a) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 141 | Does the generator site document that the following shall be collected for each waste stream:<br>A. Area(s) and/or building(s) from which the waste stream was or is generated<br>B. Waste stream volume and time period of generation (e.g., 100 standard waste boxes of retrievable stored waste generated from June 1977 through December 1977)<br>C. Waste generating process described for each building (e.g., batch waste stream generated during decommissioning operations of glove boxes), including processes associated with U134 waste generation, if applicable.<br>D. Documentation demonstrating how the site has historically managed the waste, including the historical regulatory status of the waste (i.e., TRU mixed versus TRU non-mixed waste)<br>E. Process flow diagrams (e.g., a diagram illustrating glove boxes from a specific building to a size reduction facility to a container storage area). In the case of research/development, analytical laboratory waste, or the similar processes where process flow diagrams cannot be created, a description of the waste generating processes, rather than a formal process flow diagram, may be included if this modification is justified and the justification is placed in the auditable record<br>F. Material inputs or other information that identifies the chemical content of the waste stream and the physical waste form (e.g., glove box materials and chemical handled during glove box operations, events or processes that may have modified the chemical or physical properties of the waste stream after generation, data obtained through visual examination of newly generated waste that later undergoes radiography; information demonstrating neutralization of U134 [hydrofluoric acid] and waste compatibility)<br>(Section C4-2b) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 142 | Do site documents/procedures require that the facility will provide a summary to the Permittees that summarizes all information collected, including basis and rationale for all waste stream designations? Is an example of this summary available for audit review? If discrepant hazardous waste data exist in required information, do sites consider applying all hazardous waste numbers, but assess and evaluate the information to determine the appropriate hazardous waste numbers consistent with RCRA requirements? (Section C4-2b) | | | | | |
| 143 | Do site procedures indicate that if the required AK information is not available for a particular waste stream, that the waste stream will not be eligible for an AK Sufficiency Determination? (Section C4-2) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 144 | Have the following procedures been prepared?<br>A. Procedures for identifying and assigning the physical waste form of the waste<br>B. Procedures for delineating waste streams and assigning Waste Matrix Codes<br>C. Procedures for resolving inconsistencies in acceptable knowledge documentation<br>D. Procedures for ~~headspace gas sampling and analysis,~~ visual examination and/or radiography, ~~and homogeneous waste sampling and analysis~~, if applicable<br>E. For newly generated waste, procedures describing process controls used to ensure prohibited items (specified in the WAP, Permit Attachment C) are documented and managed<br>F. Procedures to ensure radiography and visual examination include a list of prohibited items that the operator shall verify are not present in each container (e.g. liquid exceeding TSDF-WAC limits, corrosives, ignitables, reactives, and incompatible wastes)<br>G. Procedures to document how changes to Waste Matrix Codes, waste stream assignment, and associated Environmental Protection Agency hazardous waste numbers based on material composition are documented for any waste<br>H. Procedures that ensure the assignment of EPA hazardous waste numbers is appropriate, consistent with RCRA requirements, and adequately considers site historical waste management<br>I. Procedures for estimating waste material parameter weights<br>(Section C4-2b) | | | | | |
| 145 | Does the generator provide procedures or written commitment to collect additional acceptable knowledge information, as available and as necessary to augment mandatory information?<br>(Section C4-2c) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~145a~~ | ~~For waste containers that belong to LANL sealed sources waste streams, and for which headspace gas sampling and analysis is not required, are there procedures in place to assure the collection of the following additional AK?~~<br>~~A. Documentation that the waste container contents meet the definition of sealed sources per 10 CFR §30.4 and 10 CFR §835.2 (effective January 1, 2004)~~<br>~~B. Documentation of the certification of the sealed sources as U.S. Department of Transportation Special Form Class 7 (Radioactive) Material per 49 CFR §173.403 (effective October 1, 2003)~~<br>~~C. Documentation of contamination survey results that validate the integrity of each sealed source per 10 CFR §34.27 (effective January 1, 2004).~~<br>~~D. AK documentation does not indicate the use of VOCs or VOC-bearing materials as constituents of the sealed sources.~~<br>~~E. The outer casing of each sealed source must be of a non-VOC bearing material, which must be verified at the time of packaging.~~<br>~~F. AK documentation that includes but is not limited to, as available and as necessary to determine the hazardous constituents associated with sealed sources, the following: source manufacturer's sales catalogues, original purchase records, source manufacturer's fabrication documents, source manufacturer's drawings, source manufacturer's fuel capture assembly reports, source manufacturer's operational procedures for cleanliness requirements, source manufacturer's shipping documents, source manufacturer's welding records, transuranic batch material records, and information from national databases (e.g., NMMSS). All of this information may not and need not be available for each source, but sufficient information must be included in the auditable record to derive an adequate understanding of source construction and history to ensure that no VOCs are present in association with the sealed source itself that would render the source hazardous. If AK data indicate that assignment of a hazardous waste number related to organic materials is required in association with a source, this specific source will be assigned to a separate waste stream and that waste stream will be subject to headspace gas sampling unless a separate AK Sufficiency Determination is approved for the waste stream. (Section C4-2c)~~ | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 146 | Does the generator site document that all additional specific, relevant information used in the acceptable knowledge process will be identified and its use explained? Is all necessary additional information assembled and has it been appropriately used? (Section C4-2c) | | | | | |
| 147 | Does the generator site discrepancy analysis documentation (for acceptable knowledge additional and required documentation) indicate that if discrepancies are detected, the site may consider applying all hazardous waste numbers indicated in the required and additional information, but must assess and evaluate the information to determine the appropriate hazardous waste numbers consistent with RCRA requirements? (Section C4-2c) | | | | | |
| | **Training** | | | | | |
| 148 | Does the generator site have procedures to ensure that all personnel involved with acceptable knowledge waste characterization have the following training, and is this training documented?<br>A. WIPP WAP in Permit Attachment C and the TSDF-WAC specified in this permit<br>B. State and Federal RCRA regulations associated with solid and hazardous waste characterization<br>C. Discrepancy resolution and reporting<br>D. Site-specific procedures associated with waste characterization using acceptable knowledge<br>(Section C4-3a) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Procedures** | | | | | |
| 149 | Has the generator site developed the following procedures, and are these procedures technically sufficient?<br>A. Sites must prepare and implement a written procedure outlining the specific methodology used to assemble acceptable knowledge records, including the origin of the documentation, how it will be used, and any limitations associated with the information (e.g., identify the purpose and scope of a study that included limited sampling and analysis data).<br>B. Sites must develop and implement a written procedure to compile the required acceptable knowledge record.<br>C. Sites must develop and implement a written procedure that ensures unacceptable wastes (e.g., reactive, ignitable, corrosive) are identified and segregated from TRU mixed waste populations sent to WIPP.<br>D. Sites must prepare and implement a written procedure to evaluate acceptable knowledge and resolve discrepancies. For Example if different sources of information indicate different hazardous wastes are present, then sites must include all sources of information in its records and may choose to either conservatively assign hazardous waste numbers or assign only those numbers deemed appropriate and consistent with RCRA requirements. All information used to justify assignment of hazardous waste numbers must be placed in the auditable record. Further, the assignment of hazardous waste numbers shall be tracked in the auditable record to all required documentation. | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 149a | E. Sites must prepare and implement a written procedure to identify hazardous wastes and assign the appropriate hazardous waste numbers to each waste stream. The following are minimum baseline requirements/standards that site-specific procedures must include to ensure comparable and consistent characterization of hazardous waste:<br>1. Compile all of the required information in an auditable record.<br>2. Review the compiled information and delineate waste streams. Delineation of waste streams must comply with the definition in Permit Attachment C, Section C-0a, and justify combining waste historically managed separately as TRU mixed and TRU non-mixed waste streams into a single waste stream.<br>3. Review the compiled information to determine if the waste stream is compliant with the TSDF-WAC<br>4. Review the required information to determine if the waste is listed under 20.4.1.200 NMAC (incorporating 40 CFR § 261), Subpart D. Assign all listed hazardous waste numbers, unless the site chooses to justify an alternative assignment and document the justification in the auditable record.<br>5. Review the required information to determine if the waste exhibits a hazardous characteristic or may contain hazardous constituents included in the toxicity characteristics specified in 20.4.1.200 NMAC (incorporating 40 CFR § 261, Subpart C. If a toxicity characteristic contaminant is identified and is not included as a listed waste, sites may evaluate available data and assign the toxicity characteristic hazardous waste number consistent with RCRA requirements. All data examined to reach the hazardous waste number determination must be placed in the auditable record and must present a clear justification for the hazardous waste number analyses.<br>6. Review the compiled information to provide an estimate of the material parameter weights for each container to be stored or disposed of at WIPP. For newly generated waste, procedures shall be developed and implemented to characterize hazardous waste using acceptable knowledge prior to packaging. | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 149b | F. Sites shall ensure that results of audits of the TRU mixed waste characterization programs at the site are available in the records.<br>G. Sites shall identify all process controls (implemented to ensure that the waste contains no prohibited items and to control hazardous waste content and/or physical form) that have been applied to retrievably stored waste and/or may presently be applied to newly generated waste. Process controls are applied at the time of waste generation/packaging to control waste content, whereas any activities performed after waste generation/packaging to identify prohibited items, hazardous waste content, or physical form are waste characterization activities, not process controls. The AK record must contain specific process control and supporting documentation identifying when these process controls are used to control waste content. See Permit Attachment C, Section C-2 for programmatic requirements related to process controls.<br>(Section C4-3b) | | | | | |
| 150 | Does the site have implemented procedures which comply with the following criteria to establish acceptable knowledge records:<br>A. Acceptable knowledge information shall be compiled in an auditable record, including a road map for all applicable information.<br>B. The overview of the facility and TRU mixed waste management operations in the context of the facility's mission shall be correlated to specific waste stream information.<br>C. Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities shall be clearly described. For newly generated wastes, the rate and quantity of waste to be generated shall be defined.<br>D. A reference list shall be provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support the acceptable knowledge information.<br>E. Container inventories for TRU mixed waste in retrievable storage shall be delineated into waste streams by correlating the container identification to all of the required and additional AK information<br>(Section C4-3c) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 151 | If the generator site submitted an AK Sufficiency Determination Request for a specific waste stream, did the site provide all of the requisite information ~~including the identification of the applicable scenario~~ for which approval is sought?<br>(Section C-0b) | | | | | |
| | **Re-evaluating Acceptable Knowledge** | | | | | |
| 152 | Does the generator site have written procedures for the augmentation of all acceptable knowledge information using ~~sampling and analysis~~testing. ~~Sampling and analysis~~Testing consists of radiography~~,~~ and visual examination~~, headspace gas, and homogeneous waste sampling and analysis~~. ~~.~~ Do site procedures indicate that the following ~~sampling and analysis~~testing will be conducted based upon the results of the Determination Request<br>A~~ny scenario~~ KSD denied - 100% RTR or VE ~~and statistical HSG or solids S&A~~<br>~~Scenario 1 Granted -No sampling and analysis radiography/visual examination is required~~<br>~~Scenario 2 Granted-Radiography/visual examination is not required but statistical HSG or solids S&A is required~~<br>~~Scenario 3 Granted-100% RTR or VE is required, sampling and analysis is not required~~<br>(Section C4-1, C-0b) | | | | | |
| 155 | Does the generator site have procedures for reevaluating acceptable knowledge if the results of the waste confirmation indicate that the waste to be shipped does not match the approved waste stream or if the data from radiography or visual examination for waste streams without an AK Sufficiency Determination exhibit this discrepancy? Does this procedure describe how the waste is reassigned, acceptable knowledge reevaluation, and appropriate hazardous waste numbers are assigned?<br>(Section C4-3e) | | | | | |
| 156 | Do site procedures indicate that debris wastes are assigned toxicity characteristic EPA numbers based on AK regardless of the quantity or concentration? (C4-3e) | | | | | |

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| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Criteria for Assembling an Acceptable Knowledge Record Delineating the Waste Stream** | | | | | |
| 158 | If wastes are reassigned to a different waste matrix code based on site visual examination or radiography or Permittee confirmation activities, does the generator site have written documentation to ensure that the following steps are followed:<br>F. Review existing information based on the container identification number and document all differences in hazardous waste number assignments<br>G. If differences exist in the hazardous waste numbers that were assigned, reassess and document all required acceptable knowledge information (Section C~~3-b~~4-3b) associated with the new designation<br>H. Reassess and document all ~~sampling and analytical~~testing data associated with the waste<br>I. Verify and document that the reassigned waste matrix code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination<br>J. Record all changes to acceptable knowledge records<br>K. If discrepancies exist in the acceptable knowledge information for the revised waste matrix code, document the segregation of the affected portion of the waste stream, and define the actions necessary to fully characterize the waste<br>(Section C4-3e) | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~161~~ | ~~Do site procedures ensure that headspace gas and solid/soil analytical data are used to resolve AK assignments for hazardous waste, as necessary? If a constituent is detected in headspace gas that the site believes isn't from the waste process, the site must provide documentation to support any determination that organic constituents are associated with packaging materials, radiolysis, or other uses not consistent with solvent use. If the source of the detected headspace gas solvents cannot be identified, the appropriate F listing will be assigned. If a constituent in a listed waste is present in solid/soil analytical results, the appropriate listed waste shall be added to the waste stream. F-listed waste assigned by acceptable knowledge shall not be removed based on headspace gas or solids analysis. In the case of totals/TCLP analysis, do procedures reflect the allowance for concentration assessments, wherein sites may add or remove total/TCLP and non-toxic F003 constituents found in headspace and solid/soil analyses? (Section C4-3e)~~ | | | | | |
| ~~162~~ | ~~If sampling and analysis conducted to augment AK determines that a hazardous constituent as identified in headspace gas sampling or soil/homogeneous waste sampling is present in the waste, does the generator site indicate that they will: 1) assign the hazardous waste number to the entire waste stream as applicable, or 2) segregate drums containing detectable concentrations of solvent into a separate waste stream, and assign applicable hazardous waste numbers? (Section C4-3e)~~ | | | | | |
| ~~163~~ | ~~Does the generator site document, justify, and consistently delineate waste streams and assign hazardous waste numbers based on site specific permit requirements or state-enforced agreements?~~<br>~~(Section C4-3e)~~ | | | | | |
| ~~164~~ | ~~Does the generator site have written methodologies for determining the mean concentration of solvent VOCs detected by either headspace gas analysis or homogeneous waste sampling for each waste stream or waste stream lot, and are all data ("U" flags designated as one half the MDL and "J" flags, which are less than the PRQL but greater than the MDL)? (Section C4-3e)~~ | | | | | |
| ~~165~~ | ~~Do procedures ensure that spent solvent assignments are made by using the $UCL_{90}$ (of mean concentration), and comparing this with the PRQLs? If the $UCL_{90}$ exceeds the PRQL, is acceptable knowledge reevaluated and determine potential source of the constituent? (Section C4-3e)~~ | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~167~~ | ~~Does the site have written procedures for situations where concentrations of some VOCs are orders of magnitude higher than other target analytes? In these cases, elevated MDLs may be generated, and those constituents with an elevated MDL but "U" designation will not be used in mean calculations. (Section C4-3e)~~ | | | | | |
| | **Data Quality Requirements** | | | | | |
| 168 | Are acceptable knowledge processes consistently applied among all generator sites, and does each generator site comply with the following data quality requirements for acceptable knowledge documentation:<br>A. Precision - ~~Precision is the agreement among a set of replicate measurements without assumption of the knowledge of a true value~~. The qualitative determinations, such as compiling and assessing acceptable knowledge documentation, do not lend themselves to statistical evaluations of precision. However, the acceptable knowledge information will be addressed by the independent review of acceptable knowledge information during internal and external audits.<br>B. Accuracy - ~~Accuracy is the degree of agreement between an observed sample result and the true value.~~ The percentage of waste containers which require reassignment to a new waste matrix code and/or designation of different hazardous waste numbers based on ~~sampling and analysis~~testing data and discrepancies identified by the Permittees during waste confirmation will be reported as a measure of acceptable knowledge accuracy.<br>C. Completeness - ~~Completeness is an assessment of the number of waste streams or number of samples collected to the number of samples determined to be useable through the data validation process.~~ The acceptable knowledge record must contain 100 percent of the information (Permit Attachment C4-3). The usability of the acceptable knowledge information will be assessed for completeness during audits. | | | | | |

| | WAP Requirement[2] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 168a | D. Comparability - ~~Data are considered comparable when one set of data can be compared to another set of data.~~ Comparability is ensured through sites meeting the training requirements and complying with the minimum standards outlined for procedures that are used to implement the acceptable knowledge process. All sites must assign hazardous waste numbers in accordance with Permit Attachment C4-4 and provide this information regarding its waste to other sites who store or generate a similar waste stream.<br>E. Representativeness - ~~Representativeness expresses the degree to which sample data accurately and precisely represent characteristics of a population.~~ Representativeness is a qualitative parameter that will be satisfied by ensuring that the process of obtaining, evaluating, and documenting acceptable knowledge information is performed in accordance with the minimum standards established in Permit Attachment C4. Sites also must assess and document the limitations of the acceptable knowledge information used to assign hazardous waste numbers (e.g., purpose and scope of information, date of publication, type and extent to which waste parameters are addressed).<br>(Section C3-~~9~~3) | | | | | |
| 169 | Does the generator site address quality control by tracking its performance with regard to the use of acceptable knowledge by: 1) assessing the frequency of inconsistencies among information, and 2) documenting the results of waste discrepancies identified by the generator/storage site during waste characterization or the Permittees during waste confirmation using radiography, review of radiography audio/video recordings, visual examination, or review of visual examination records. In addition, the acceptable knowledge process and waste stream documentation must be evaluated through internal assessments by generator/storage site quality assurance organizations. (Section C4-3e) | | | | | |

1. NMED expects a traceability analysis to be performed, the results of which should be presented on this checklist under the "Examples of Implementation" column. Further, the traceability analysis process and results should be discussed in the Final Audit Report.
2. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.

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**~~Table C6-4 Headspace Gas Checklist~~**

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1

## ~~Headspace Gas Checklist~~

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | ~~Headspace Gas Sampling Frequency~~ | | | | | |
| ~~182~~ | ~~Are procedures in place to ensure that randomly selected retrievably stored and newly generated waste containers will undergo headspace gas sampling and analysis as required to augment AK?~~<br>~~(Section C-3a)~~ | | | | | |
| ~~183~~ | ~~Are procedures in place to ensure that randomly selected containers will be allowed to equilibrate to sampling room temperature for 72 hours prior to sampling (18º C or higher) and that the drum ages specified in accordance with Section C1-1a(1) are met? All information necessary to determine drum age criteria must be determined, including but not limited to:~~<br>~~• Scenario Determination~~<br>~~• Packaging Configuration~~<br>~~• Filter Diffusivity~~<br>~~• Liner/Lid Opening Diameter~~<br>~~? (Section C1-1a)~~ | | | | | |
| | ~~Headspace Gas Sampling General Requirements~~ | | | | | |
| ~~184~~ | ~~Are procedures in place to ensure all containers of waste are vented through filters to ensure that gases are adequately vented preventing over pressurization or development of conditions that would lead to the development of ignitable, corrosive, reactive, or other characteristic waste? (Section C-1c)~~ | | | | | |
| ~~186~~ | ~~Are procedures in place to ensure that the following gas sample container and holding time requirements are met:~~<br>~~• The minimum sample volume for VOC. sample collection is 250 mL. (Note: a single 100 mL sample may be collected if the headspace is limited)~~<br>~~• Holding temperatures shall be between 0º C and 40º C~~<br>~~(Table C1-1)~~ | | | | | |
| ~~187~~ | ~~Are procedures in place to ensure that all sampling is performed in an appropriate radiation containment area? (Section C1-1a)~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~188~~ | ~~Are procedures in place to ensure that headspace gas is analyzed for the analytes listed in Table C3-2 of the Attachment C3? (Section C1-1a(1))~~ | | | | | |
| ~~189~~ | ~~Are procedures in place to ensure that all headspace gas analyses utilize either SUMMA® or equivalent canisters or on-line integrated sampling/analysis systems? (Section C1-1a(1))~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | ~~**Manifold Sampling**~~ | | | | | |
| ~~190~~ | ~~Are procedures, processes, and equipment in place to ensure that the following sampling procedures are implemented:~~<br>~~• The sampling equipment is leak checked and cleaned upon first use and as needed~~<br>~~• The manifold and sample canisters are evacuated to 0.1 mm Hg prior to sample collection~~<br>~~• Cleaned and evacuated sample canisters are attached to the evacuated manifold before the manifold inlet valve is opened~~<br>~~• The manifold inlet valve is attached to a changeable filter connected to either a side port needle sampling head capable of forming an airtight seal (for penetrating a filter or rigid poly liner when necessary), a drum punch sampling head capable of forming an airtight seal (capable of punching through the metal lid of a drum while maintaining and airtight seal for sampling through the drum lid), or a sampling head with an airtight fitting for sampling through a pipe overpack container filter vent hole. Refer to Section C1-1a(4) for descriptions of these sampling heads.~~<br>~~• Field blanks are collected using samples of room air collected in the sampling area in the immediate vicinity of the waste container. *(Note: field blanks for SUMMA® canisters are collected directly into the canister without the use of the manifold.)*~~<br>~~• Manifold equipped with purge assembly that allows QC samples to be collected through all sampling components that affect compliance with QAOs~~<br>~~• The manifold internal volume is calculated and documented in a field logbook~~<br>~~• The total volume of headspace gas collected is calculated by adding the canister volume and internal manifold volume and should be less than 10 percent of the available headspace volume when a volume estimate is available~~<br>~~(Section C1-1a(2))~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~191~~ | ~~Are procedures, processes, and equipment in place to ensure that the following manifold sample side conditions are met:~~<br>• ~~The sampling head forms a leak-tight connection with the sampling manifold~~<br>• ~~A flexible hose allowing movement from the purge assembly to the waste container~~<br>• ~~Pressure sensors that are pneumatically connected to the manifold and must be able to measure absolute pressure from 0.05 mm Hg to 1000 mm Hg with a resolution that must be 0.01 mm Hg at 0.05 mm of Hg. The pressure sensors shall have an operating range of 15°C to 40°C.~~<br>• ~~Sufficient canister ports shall be available to allow simultaneous collection of headspace gas samples and duplicates for VOC analysis.~~<br>• ~~Ports not occupied with sample canisters require a plug to prevent ambient air from entering the system~~<br>• ~~Ports shall have VCR® fittings for connection to the sample canisters to prevent degradation of the fitting on the canister and manifold.~~<br>• ~~Sample canisters are leak-free, stainless steel pressure vessels, with a Cr-NiO SUMMA®-passivated interior surface or canisters with equivalently inert surfaces, bellows valve, and a pressure/vacuum gauge. All canisters shall have VCR® fittings to sampling and analytical equipment~~<br>• ~~The pressure/vacuum gauge must be mounted on each manifold and shall be helium-leak tested to $1.5 \times 10^{-7}$ cc/s, have all stainless steel construction, and be capable of operating at temperatures to 125°C~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~191a~~ | • ~~A dry vacuum pump capable of reducing the manifold pressure to 0.05 mm Hg. (Note: If an oil vacuum pump is used precautions such as a molecular sieve or cryogenic trap shall be used to prevent diffusion of oil vapors back into the manifold)~~<br>• ~~A minimum distance between the needle and the valve that isolates the pump from the manifold in order to minimize the dead volume in the manifold.~~<br>• ~~If real time equipment blanks are not available, the manifold shall be equipped with an OVA capable of detecting all analytes listed in Table C3-2 and is capable of measuring total VOC concentrations below the lowest headspace gas PRQL~~<br>~~(Section C1-1a(2))~~ | | | | | |
| ~~192~~ | ~~Are procedures, processes, and equipment in place to ensure that the following manifold standard side conditions are met:~~<br>• ~~A cylinder of compressed zero air, helium, argon, or nitrogen that is hydrocarbon and $CO_2$ free air (only hydrocarbon and $CO_2$-free gases required for FTIRS) and certified by the manufacturer to contain less than one ppm VOCs. The gas is used to clean the manifold between samples and to provide gas for the collection of equipment and on-line blanks~~<br>~~*(Note: a zero air or nitrogen generator may be used, provided a sample of air is collected and found to contain less than 1 ppm total VOCs and the air is humidified)*~~<br>• ~~Cylinders of reference gas with known concentrations of analytes from Table C3-2 certified by the manufacturer to provide gases for evaluating the accuracy of the headspace gas sampling process~~<br>• ~~All cylinders of reference gases and zero air shall be connected to flow regulating devices~~<br>• ~~A humidifier filled with ASTM Type I or II water, connected, and opened to the standard side of the manifold between the compressed gas cylinders and the purge assembly shall be used, if the Fourier Transform Infrared System (FTIRS) is not used. No humidifier if the FTIRS is used *(Note: Compressed gas may include water vapor between 1000 and 10000 ppmv in lieu of a humidifier)*~~<br>• ~~The humidifier is off-line during system evacuation to prevent manifold flooding~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~192a~~ | ~~• A purge assembly that allows the sampling head to be connected to the standard side of the manifold.~~<br>~~• A flow indicating device or pressure regulator that is connected downstream of the purge assembly to monitor the flow rate or pressure of gases through the purge assembly to ensure that excess flow is available to prevent ambient air from contaminating the QC samples and allow sample of gas from the compress gas cylinders to be collected near ambient pressure.~~<br>~~(Section C1-1a(2))~~ | | | | | |
| ~~193~~ | ~~Do procedures ensure that NIST Certified (or equivalent) ambient pressure sensors maintained in the sampling area must have a sufficient measurement range for the expected ambient barometric pressures and a resolution shall be 1.0 mm Hg or less? (Section C1-1a(2))~~ | | | | | |
| ~~194~~ | ~~Do procedures ensure that the NIST traceable (or equivalent) temperature sensor in the sampling location shall have a sufficient measurement range for the ambient temperatures 18 to 50°C? (Section C1-1a(2))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Direct Canister Sampling** | | | | | |
| ~~195~~ | ~~Are procedures, processes, and equipment in place to ensure that the following operating conditions are in place for direct canister sampling:~~<br>~~• Canisters are evacuated to 0.1 mm Hg prior to use and attached to a changeable filter connected to the sampling head~~<br>~~• Sampling heads are capable of either punching through the metal lid of the drums while maintaining an airtight seal for sampling through the drum lid, penetrating a filter or the septum in the orifice of a self-tapping screw, or maintaining an airtight seal for sampling through a pipe overpack container filter vent hole.~~<br>~~• Field duplicates are collected in the same manner and at the same time and using the same type of sampling apparatus as used for headspace gas sample collection.~~<br>~~• Field blanks shall be samples of room air collected in the immediate vicinity of the waste drum sampling area prior to removal of the drum lid.~~<br>~~• Equipment blanks and field reference standards shall be collected using a purge assembly equivalent to the standard side of the manifold~~<br>~~• Less than 10 percent of the headspace is withdrawn when a headspace estimate is available~~<br>~~(Note: The total volume withdrawn can be determined by adding the canister volume and the internal volume of the sampling head)~~<br>~~• Each sample canister shall be equipped with a pressure/vacuum gauge capable of indicating leaks and sample collection volumes. The gauge shall be helium leak tested to $1.5 \times 10^{-7}$ cc/s, have all stainless steel construction and be capable of tolerating temperatures to 125°C~~<br>~~• Summa® canisters or equivalent are used to collect samples~~<br>~~(Section C1-1a(3))~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Sampling Heads Under Drum Lids: Sampling Through a Carbon Filter** | | | | | |
| ~~196~~ | ~~Are procedures, process, and equipment adequate to ensure that samples collected through a filter meet the following requirements:~~<br>• ~~The lid of the drum's 90-mil rigid poly liner shall contain a hole for venting to the drum~~<br>• ~~That non-vented drums are not sampled until an internal nonconformance report is prepared, submitted, and resolved in order to obtain a representative sample~~<br>• ~~The filter shall be sealed to prevent outside air from entering the drum~~<br>• ~~The sampling head for collecting drum headspace gas shall consist of a side-port needle, a filter to prevent particle contamination of the sample, and an adapter to connect the side-port needle to the filter~~<br>• ~~The sampling head is cleaned or replaced after each use~~<br>• ~~The housing of the filter shall allow insertion of the sampling needle through the filter element or a sampling port with septum that bypasses the filter element into the drum headspace~~<br>• ~~The side port needle shall be used to reduce the potential for plugging~~<br>• ~~The purge assembly shall be modified for compatibility with the side port needle.~~<br>~~(Section C1-1a(4)(i))~~ | | | | | |
| | **Sampling Heads Under Drum Lids: Sampling Through the Drum Lid** | | | | | |
| ~~197~~ | ~~Are procedures in place to establish the criteria for sampling through the drum lid as opposed to sampling through a filter?~~<br>~~(Section C1-1a(4)(ii))~~ | | | | | |
| ~~197a~~ | ~~If sampling through a pipe overpack container filter vent hole with an airtight device is used, are procedures in place to ensure that a sampling head with an airtight seal for sampling through a pipe overpack container filter vent hole are available? (Section C1-1a(4)(iii))~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~197b~~ | ~~If sampling through a pipe overpack container filter vent hole is used, are the following criteria met?~~<br>• ~~The seal between the pipe overpack container surface and sampling apparatus shall be designed to minimize intrusion of ambient air.~~<br>• ~~The filter shall be replaced as quickly as is practicable with the airtight sampling apparatus to ensure that a representative sample can be taken.~~<br>• ~~All components of the sampling system that come into contact with sample gases shall be cleaned according to requirements for direct canister sampling or manifold sampling, whichever is appropriate, prior to sample collection.~~<br>• ~~Equipment blanks and field reference standards shall be collected through all the components of the sampling system that contact the headspace-gas sample.~~<br>• ~~During sampling, openings in the pipe overpack container shall be sealed to prevent outside air from entering the container.~~<br>• ~~A flow-indicating device shall be connected to sampling system and operated according to the direct canister or manifold sampling requirements, as appropriate.~~<br>~~(Section C1-1a(4)(iii))~~ | | | | | |
| ~~197c~~ | ~~If sampling through a pipe overpack container filter vent hole is used, are the following criteria met?~~<br>• ~~The site has documentation that demonstrates that they have determined through testing the appropriate length of time for exchanging the filter with the sampling device to assure representative samples are collected.~~<br>~~(Section C1-1a(4)(iii))~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~198~~ | ~~Are procedures, process, and equipment adequate to ensure that samples collected through the drum lid by punching meet the following requirements:~~<br>~~• The lid of the drum's 90-mil rigid poly liner shall contain a hole for venting to the drum. If the DAC for Scenario 1 is met, a sample may be collected from inside the 90-mil rigid poly liner.~~<br>~~• If headspace gas samples are collected from the drum headspace prior to venting the 90-mil rigid poly liner, the sample is not acceptable and a nonconformance report shall be prepared, submitted, and resolved.~~<br>~~• The drum lid shall be breached using a punch that forms an airtight seal between the drum lid and the manifold or canister~~<br>~~• The seal between the drum lid and the sampling head shall be designed to minimize the intrusion of ambient air~~<br>~~• All components of the sampling system that come in contact with sample gases shall be purged with humidified zero air, nitrogen, or helium prior to sample collection~~<br>~~• Equipment blanks and field reference standards shall be collected through all components of the punch that contact the headspace gas sample~~<br>~~• Pressure shall be applied to the punch until the drum lid has been breached~~<br>~~• Provisions shall be made to relieve excessive drum pressure increases during drum punch operations; potential pressure increases may occur during sealing of the drum punch to the drum lid~~<br>~~• The filter is sealed to prevent outside air from entering the drum~~<br>~~(Section C1-1a(4)(ii))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~198a~~ | ~~• A flow indicating device or pressure regulator to verify flow of gases shall be pneumatically connected to the drum punch and operated in the same manner as the flow indicating device~~<br>~~• Equipment are used to secure the drum punch sampling system to the drum lid~~<br>~~• If the headspace gas sample is not taken at the time of drum punching, the presence and diameter of the rigid liner vent hole is documented during the punching operation for use in determining an appropriate Scenario 2 DAC.~~<br>~~(Section C1-1a(4)(ii))~~ | | | | | |
| | **Quality Control Sample Collection** | | | | | |
| ~~199~~ | ~~Are procedures in place to ensure that the following QC sample requirements are met:~~<br>~~• Field QC samples are collected on per sample batch basis for manifold and direct canister sampling. A sampling batch is defined as up to 20 samples collected within 14 days of the first sample~~<br>~~• Field samples are collected and analyzed on a per on-line batch basis for on-line sampling/analysis systems. An on-line batch is defined as the number of headspace gas samples that are collected within a 12 hour period from the same on-line integrated analysis system~~<br>~~• For the manifold sampling method, field blanks, equipment blanks, field duplicates, and field reference samples are collected prior to sample collection on a per sampling batch basis or one per day, whichever is more frequent~~<br>• ~~For the direct canister sampling method field blanks and field duplicates are collected on a per sampling batch basis prior to sample collection; while equipment blanks and field reference samples are collected after equipment purchase, cleaning, and assembly~~ | | | | | |
| ~~199a~~ | ~~• For the On-line sampling method, field blanks, equipment blanks, field duplicates, and field reference samples are collected on a per on-line batch basis. *(Note: The on-line blank replaces the laboratory and equipment blanks, the on-line duplicate replaces the field duplicate and the laboratory duplicate, and the on-line sample control replace the field reference standard and the laboratory control sample.)*~~<br>~~(Section C1-1b, C1-1b(1), C1-1b(2), C1-1b(3), C1-1b(4))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~200~~ | ~~Do procedures adequately assign the site project manager with the responsibility of monitoring field QC results and initiate the nonconformance report process in the event the following acceptance criteria are not met or sample collection frequencies are not met:~~<br>~~• Field and equipment blanks shall be less than 3 times the detection limits specified in Table C3-2 and equipment blank results determined by FTIR shall be less than the PRQL specified in Table C3-2 (Section C1-1b(1) and C1-1b(2))~~<br>~~• Field reference standards shall have a recovery of between 70 and 130% (Table C1-3)~~<br>~~• Field Duplicates shall have an RPD of less than or equal to 25~~<br>~~(Sections C1-1b and C1-1b(4); Table C1-3)~~ | | | | | |
| ~~201~~ | ~~Are procedures in place to ensure that field reference standards meet the following criteria:~~<br>~~• Field reference standards shall contain a minimum of 6 analytes listed in Table C3-2 at a range of between 10 and 100 ppmv and at concentrations greater than the MDL~~<br>~~• Field reference standards shall be traceable to a nationally recognized standard, if available~~<br>~~• If commercial gases are used, they shall be accompanied by a Certificate of Analysis and all field reference standards are traceable to certificates.~~<br>~~• Commercial gases are not used past the manufacturer specified shelf life.~~<br>~~• Field reference samples are submitted blind to the laboratory at a frequency of one per sampling batch. (Note: Field reference standards may be discontinued for direct canister method if QAO accuracy objectives are met)~~<br>~~(Section C1-1b(3))~~ | | | | | |
| ~~202~~ | ~~Are procedures in place to ensure that field duplicate samples are collected sequentially and in accordance with Table C1-1. (Section C1-1b(4))~~ | | | | | |

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|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Sample Equipment Testing, Inspection and Maintenance** | | | | | |
| ~~203~~ | ~~Are procedures in place to ensure that sample containers are cleaned in accordance with the following specifications:~~<br>~~• All sampling components that contact sample gases are constructed of inert materials such as stainless steel or Teflon®~~<br>~~• The sampling manifold and canisters are properly cleaned and leak checked prior to each sampling event in accordance to or equivalent with TO-14A or TO-15 methodology~~<br>~~• SUMMA® canisters or equivalent are cleaned on an equipment cleaning batch basis. An equipment cleaning batch is defined as the number of canisters that can be cleaned together at one time using the same cleaning method~~<br>~~• The cleaning system consists of an optional oven and a vacuum manifold which uses a dry vacuum pump or a cryogenic trap backed by an oil sealed pump~~<br>~~• Prior to cleaning a 24 hour leak check shall be performed (+/- 2 psig) on all canisters~~<br>~~• Canisters that shall be checked for leaks, repaired, and reprocessed~~<br>~~• One canister per equipment cleaning batch is filled with humid zero air or humid high purity nitrogen and analyzed for VOCs~~<br>~~• A batch is considered clean if VOC concentrations are less than 3 times the MDLs specified in Table C3-2~~<br>~~• Certified leak-free canisters are evacuated to 0.1 mm Hg or less for storage~~<br>~~• Canister cleaning certification documentation is available at the cleaning facility and the cleaning facility initiates canister tags.~~<br>~~(Section C1-1c, C1-1c(1))~~ | | | | | |
| ~~204~~ | ~~Are procedures in place to ensure that manifold pressure sensors and ambient air temperature sensors are certified prior to initial use and annually using NIST traceable standards. In addition OVAs if used shall be calibrated daily using known calibration gases and the balance of the OVA calibration is consistent with the manifold purge gas.~~<br>~~(Section C1-1d)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~205~~ | ~~Are procedures in place to ensure that sampling equipment are cleaned and leak checked using the following specifications:~~<br>• ~~Surfaces of all sampling equipment that will come in contact with sample gases are thoroughly inspected and cleaned prior to assembly~~<br>• ~~Manifolds and sampling heads shall be purged with humidified zero air, nitrogen, or helium and leak checked after assembly~~<br>• ~~The cleaning shall be repeated if routine system cleaning is inadequate~~<br>• ~~Manifolds and sampling heads which are reused shall be cleaned and leak checked according to procedures in the EPA's Compendium Method TO-14A or TO-15 after sample collection, field duplicate collection, field blank collection, and after the additional cleaning require for field reference samples. All manifold ports shall be capped or closed with valves (sample canisters may be attached as well)~~<br>• ~~Manifolds are cleaned by heating the sample side of the manifold to 150°C and periodically evacuated and flushed with humidified zero air, nitrogen, or helium~~<br>• ~~Manifolds not in use are demonstrated as clean before storage with a positive pressure of humidified zero air, nitrogen, or helium gas in the sampling and standard sides~~<br>• ~~Sampling is suspended when the analysis of an equipment blank indicated the VOC limits have been exceeded or if a leak test fails.~~<br>• ~~Sampling systems are cleaned after field reference standard collection by installing a gas tight connector in place of the sampling head, between the flexible hose and purge assembly. This allows the sample and standard side to be flushed with humidified zero air, nitrogen, or helium in conjunction with heated pneumatic lines~~<br>• ~~Needles, airtight fitting or seal, adapters, and filters are cleaned in accordance with the EPA Method TO-14A or TO-15 procedures. Sample heads shall be discarded or cleaned according to Method TO-15. In addition, the needle, the airtight fitting and seal, and the filter should be purged with zero air, nitrogen, or helium and capped for storage~~<br>~~(Section C1-1c(2) , Section C1-1c(3), Section C1-1c(4), and Section C1-c(5))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Sample Handling and Custody** | | | | | |
| ~~207~~ | ~~Do formats for field logs and custody records specify documentation of the following information:~~<br>~~• Name of sampling facility~~<br>~~• Waste container identification number~~<br>~~• Sample identification number of each sample referenced to waste container~~<br>~~• Sample matrix~~<br>~~• Time and date of sample collection~~<br>~~• Type/number and size of sample container(s)~~<br>~~• Method of sample preservation~~<br>~~• Requested analyses~~<br>~~• Sampler(s) name through signature~~<br>~~• Signatures of custodians relinquishing and receiving custody of samples including date and time of transfer until time of final disposition~~<br>~~• Analytical laboratory~~<br>~~• Off-site shipping information (date, time, shipper, mode, air bill or lading number)~~<br>~~(Section C1-5)~~ | | | | | |
| ~~208~~ | ~~Are procedures are in place to ensure that samples and sampling equipment are identified with unique identification numbers? (Section C1-5)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~209~~ | ~~Do sample tags or labels contain the following information:~~<br>~~• Sample Description~~<br>~~• Ambient temperature and pressure~~<br>~~• Sample identification number~~<br>~~• Analyses requested~~<br>~~• Date/Time of collection~~<br>~~• QC Designation (if applicable)~~<br>~~• Sampler's initials and organization~~<br>~~(Section C1- 5)~~ | | | | | |
| ~~210~~ | ~~All sampling equipment, canisters, and samples are identified with unique identification numbers that are traceable to equipment cleaning batches.~~<br>~~(Section C1- 5)~~ | | | | | |
| ~~211~~ | ~~Are procedures in place to ensure samples are sealed with intact custody seals and that one or more of the following custody conditions are met:~~<br>~~• It is in the possession of an authorized individual~~<br>~~• It is in the view of an authorized individual, after being in the possession of that individual~~<br>~~• It was in the possession of an authorized individual and access to the sample was controlled by locking or placement of signed custody seals that prevent undetected access~~<br>~~• It is in a designated secure area, such as a controlled access location with complete documentation of personnel access or a radiological containment area (hot cell or glove box)~~<br>~~(Section C1- 5)~~ | | | | | |
| ~~212~~ | ~~Are procedures in place to ensure that discrepant sample information, indications of damage, or indications of tampering are documented? (Section C1- 5)~~ | | | | | |
| ~~214~~ | ~~Are procedures in place to ensure that sample custody is maintained until the sample is released by the site project manager or expended?~~<br>~~(Section C1- 5)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~215~~ | ~~Are procedures in place to ensure that SUMMA canisters are packaged to prevent damage to the pressure gauge or associated connections by packaging in metal boxes with separate compartments or cardboard boxes with foam inserts? (Section C1- 6)~~ | | | | | |
| ~~216~~ | ~~Are procedures in place to ensure that samples are packaged to prevent damage to the sample container and maintain preservation temperature? (Section C1- 6)~~ | | | | | |
| ~~217~~ | ~~Are procedures in place to ensure that adequate cold packs are included in the DOT approved sample shipping container to ensure that all temperature requirements are met? (Section C1- 6)~~ | | | | | |
| ~~218~~ | ~~Are procedures in place to ensure that sample COC forms are secured for shipment to the inside of the sealed or locked shipping container lid and that samples and shipping containers are affixed with tamper proof seals or devices? (Section C1- 6)~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Laboratory Operations** | | | | | |
| ~~220~~ | ~~Are procedures in place to ensure that all VOC analyses are evaluated using the following criteria:~~<br>~~• Precision is assessed by analyzing laboratory duplicates, Laboratory Control Sample (LCS) , and PDP blind-audit samples in comparison to Table C3- 2~~<br>~~• Accuracy as %R shall be assessed by analyzing LCS samples and PDP blind-audit samples in comparison to criteria in Table C3-3~~<br>~~• MDLs are expressed in nanograms/ for VOCs and must be less than or equal to those listed in Table 3-2~~<br>~~• Laboratory completeness shall be expressed as the number of samples analyzed with valid results as a percent of the total number of samples submitted for analysis. A composited sample is treated as one sample for the purposes of completeness, because only one sample is run through the analytical instrument~~<br>~~• Comparability shall be achieved through the use of standardized methods, traceable standards by requiring successful participation in the PDP program~~<br>~~• Representativeness will be achieved by collecting sufficient numbers of samples using clean sampling equipment that does not introduce sample bias.~~<br>~~• All method detection limits and program required detection limits shall be less than the Program Required Detection Limits listed in Table C3-2 and the detection limit study procedures shall be documented in laboratory SOPs. In addition, the laboratory shall demonstrate that they are capable of meeting the Program Required Detection Limits by analyzing at least one calibration standard below the PRQL~~<br>~~(Section C3-5)~~ | | | | | |
| ~~221~~ | ~~Are procedures in place to ensure that only laboratories that are qualified through participation in the Performance Demonstration Program are eligible to analyze waste samples? (Section C-3a(3))~~ | | | | | |

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| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~222~~ | ~~Are procedures in place to ensure that Tentatively Identified Compounds shall be added to the target compound list if they are reported in 25% of the waste containers sampled from a given waste stream and if they appear in the 20 NMAC 4.1.200 (incorporating 40 CFR §261) Appendix VIII list? (Section C-3a(1))~~ | | | | | |
| ~~222a~~ | ~~Are procedures documented to ensure that the following criteria are met with regard to the recognition and reporting of TICS for GC/MS Methods for headspace gas sampling:~~<br>~~• Relative intensities of major ions in the reference spectrum (ions greater than 10% of the most abundant ion) should be present in the sample spectrum.~~<br>~~• The relative intensities of the major ions should agree within ± 20 percent.~~<br>~~• Molecular ions present in the reference spectrum should be present in the sample spectrum.~~<br>~~• Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.~~<br>~~• Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks.~~<br>~~• The reference spectra used for identifying TICs shall include, at minimum, all of the available spectra for compounds that appear in the 20.4.1.200 NMAC (incorporating 40 CFR Part 261) Appendix VIII list. The reference spectra may be limited to VOCs when analyzing headspace gas samples.~~<br>~~• TICs for headspace gas analyses that are performed through FTIR analyses shall be identified in accordance with the specifications of SW-846 Method 8410.~~<br>~~(Section C3-1)~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~222b~~ | ~~Are procedures in place to assure that TICs are reported as part of the analytical batch data reports for GC/MS Methods in accordance with the following minimum criteria:~~<br>• ~~a TIC in an individual container headspace gas or solids sample shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 10% of the area of the nearest internal standard.~~<br>• ~~a TIC in a composited headspace gas sample that contains 2 to 5 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 2% of the area of the nearest internal standard.~~<br>• ~~a TIC in a composited headspace gas sample that contains 6 to 10 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 1% of the area of the nearest internal standard.~~<br>• ~~a TIC in a composited headspace gas sample that contains 11 to 20 individual container samples shall be reported in the analytical batch data report if the TIC meets the SW-846 identification criteria listed above and is present with a minimum of 0.5% of the area of the nearest internal standard.~~<br>~~(Section C3-1)~~ | | | | | |
| | ~~**Quality Assurance Objectives**~~ | | | | | |
| ~~224~~ | ~~Are procedures in place to ensure that the precision of the headspace gas sampling and analysis must be assessed by the sequential collection of field duplicates for manifold sampling operations or simultaneous collection of field duplicates for direct canister sampling operations for VOCs? (Section C3-2)~~ | | | | | |
| ~~225~~ | ~~Are procedures in place to ensure that corrective action will be taken if the duplicate RPD exceeds 25% for any analyte found greater than the PRQL in both of the duplicate samples? (Section C3-2)~~ | | | | | |
| ~~226~~ | ~~Are procedures in place to ensure that the accuracy of headspace gas sampling is assessed through the collection of field reference standards and at a frequency of one field response standard for every 20 containers sampled or per sampling batch and through the collection of equipment blanks at the frequency of one for every equipment cleaning batch? (Section C3-2)~~ | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| ~~227~~ | ~~Are procedures in place to ensure that corrective actions are taken if the field reference standard is less than 70% recovery or greater than 130% and that if the blank concentration for any blank exceeds 3 times the MDL listings in Table C3-2? (Section C3-2)~~ | | | | | |
| ~~228~~ | ~~Are procedures in place to ensure that sampling completeness shall be expressed as the number of valid samples collected as a percent of the total number of samples collected for each waste steam, where a valid sample is defined as a sample collected in accordance with approved sampling methods and the drum was properly prepared for sampling? (Section C3-2)~~ | | | | | |
| ~~229~~ | ~~Are procedures in place to ensure that the minimum sampling completeness percentage for any waste stream is 90 percent? (Section C3-2)~~ | | | | | |
| ~~230~~ | ~~Are procedures in place to ensure that sample comparability is assured through the use and application of uniform procedures and equipment and application of data usability criteria, and that corrective action is taken if the uniform procedures and equipment are not used without approved and justified deviations (Section C3-2)~~ | | | | | |
| ~~231~~ | ~~Are procedures in place to ensure that sample representativeness is maintained (Section C3-2)~~ | | | | | |

~~1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.~~

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~~**Table C6-5 Radiography Checklist**~~

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1 **Table C6-3 Radiography Checklist ~~Radiography Checklist~~**

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Quality Assurance Objectives** | | | | | |
| 233 | Are process procedures in place to meet the following Quality Assurance Objectives?<br>Precision<br>• Does the site describe in its QAPjP and SOP(s) activities to reconcile any discrepancies between two radiography operators with regard to identification of the waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases through independent replicate scans and independent observations? And additionally, activities to verify the precision of radiography prior to use by tuning precisely enough to demonstrate compliance with QAOs through viewing an image test pattern?<br>Accuracy<br>• Was accuracy obtained by using a target to tune the image for maximum sharpness and by requiring operators to successfully identify 100 percent of the required items in a training container during their initial qualification and subsequent requalification? | | | | | |
| 233a | Completeness<br>• Was an audio/videotape (or equivalent media) of the radiography examination and a radiography data form validated according to the requirements in Section C3-~~10~~4?<br>• Was an audio/videotape (or equivalent media) of the radiography examination and a radiography data form obtained for 100% of the waste containers subject to radiography?<br>Comparability<br>• Is comparability ensured through the use of standardized radiography procedures and operator training and qualifications<br>(Section C3-~~4a~~2a) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Characterization and System Requirements** | | | | | |
| 234 | Does the site have procedures to ensure that radiography is used to identify and verify waste container contents and verify the waste's physical form? Does the site have procedures to identify prohibited materials? (Section C-~~3c~~3b; C1-~~3~~1) | | | | | |
| 235 | Do procedures or other supporting documentation ensure that every waste container will undergo radiography and/or VE as necessary to augment AK? (Section C-~~3c~~3b) | | | | | |
| 236 | Do procedures ensure that containers whose contents prevent full examination are examined by visual examination rather than by radiography unless the site certifies that visual examination would provide no additional relevant information for that container based on the AK information for the waste stream? (Section C1-~~3~~1) | | | | | |
| 237 | Do procedures or other supporting documentation ensure that the physical form determined by radiography is compared with the waste stream descriptions? If discrepancies are noted, will a new waste stream be identified? (Section C-~~3c~~3b) | | | | | |
| 238 | Are there procedures to ensure the data is obtained from an audio/video recorded scan provided by trained radiography operators? (Section C1-~~3~~1) | | | | | |
| 239 | Were all activities required to achieve the radiography objective described in site Quality Assurance Project Plans (QAPjPs) and Standard Operating Procedures (SOPs)? (Section C3-~~4~~2) | | | | | |
| 240 | Did the radiography system consist of the following equipment or equivalent:<br>• an X-ray producing device?<br>• an imaging system?<br>• an enclosure for radiation protection?<br>• a waste container handling system?<br>• an audio/video recording system or equivalent?<br>• an operator control and data acquisition station?<br>(Section C1-~~3~~1) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 241 | Did the X-ray producing device have controls which allow the operator to vary voltage, thereby controlling image quality? Was it possible to vary the voltage, typically between 150-400 kV, to provide an optimum degree of penetration through the waste? Was high-density material examined with the X-ray device set on the maximum voltage? Was low-density material examined at lower voltage settings to improve contrast and image definition? (Section C1-~~3~~1) | | | | | |
| 242 | Do procedures or other documentation ensure that an audio/videotape or equivalent is made of the waste container scan and maintained as a non-permanent record? (Section C1-~~3~~1) | | | | | |
| | **Data Compilation** | | | | | |
| 243 | Are there procedures to ensure that a radiography data form is used to document the waste matrix code, ensure the waste container contains no ignitable, corrosive or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and verify that the physical form of the waste is consistent with the waste stream description documented on the WSPF? (Section C1-~~3~~1) | | | | | |
| 245 | If radiography indicates that the waste does not match the waste stream description, do procedures ensure that the appropriate corrective action was taken? (Section C-~~3c~~3b) | | | | | |
| 246 | If a discrepancy is noted, do procedures ensure that the proper waste stream assignment is determined, the correct hazardous waste numbers assigned, and the resolution documented? (Section C-~~3c~~3b) | | | | | |
| | **Training** | | | | | |
| 247 | Do site procedures ensure that only trained personnel are allowed to operate radiography equipment? (Section C1-~~3~~1) | | | | | |
| 248 | Do site procedures ensure that training requirements for radiography operators is based upon existing industry standard training requirements? (Section C1-~~3~~1) | | | | | |
| 249 | Does the documented training program provide radiography operators with both formal and on-the-job training (OJT)? (Section C1-~~3~~1) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 250 | Does the documented training program ensure that the radiography operators are instructed in the specific waste generating practices and typical packaging configurations expected to be found in each waste stream at the site? (Section C1-~~3~~1) | | | | | |
| 251 | Does the documented training program ensure that the OJT and apprenticeship are conducted by an experienced, qualified radiography operator prior to qualification of the candidate? (Section C1-~~3~~1) | | | | | |
| 252 | Is the documented training program site specific? (Section C1-~~3~~1) | | | | | |
| 262 | Does the documented training program ensure that a training drum with various container sizes is scanned by each operator on a semiannual basis? Is the videotape reviewed by a supervisor to ensure that operators' interpretations remain consistent and accurate? (Section C1-~~3~~1) | | | | | |
| 263 | Do site procedures ensure that the site prepares Testing Batch Data Reports or equivalent which includes all data pertaining to radiography for up to 20 waste containers without regard to waste matrix? (Section C3-~~10~~4) | | | | | |
| | **Quality Assurance** | | | | | |
| 265 | Does the documented training program ensure that the imaging system characteristics are verified on a routine basis? (Section C1-~~3~~1) | | | | | |
| 266 | Do procedures ensure that independent replicate scans and replicate observations of the video output of the radiography process are performed under uniform conditions and procedures? Are independent replicate scans performed on one waste container per day or per testing batch of 20 samples, which ever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container? Are independent observations of one scan (not the replicate scan) performed once per day or per testing batch, which ever is less frequent, by a qualified radiography operator that was not involved in the original scan of the waste container? (Section C1-~~3~~1) | | | | | |
| 267 | Do procedures ensure that oversight functions include periodic audio/video media reviews of accepted waste containers, are performed by qualified radiography operators that were not involved in the original scans of the waste containers? (Section C1-~~3~~1) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| 268 | Is the site project manager responsible for monitoring the quality of the radiography data and calling for corrective action, when necessary? (Section C1-~~3~~1) | | | | | |
| | **Data Validation, Review, Verification and Reporting** | | | | | |
| 277 | Do procedures ensure that all applicable data generation review verification and validation activities specified in C3-~~10~~ 4 are followed, including all signatory releases? (Section C3-~~10~~4) | | | | | |
| 278 | Do procedures ensure that radiography tapes have been reviewed at a frequency of one waste container per day or once per testing batch, whichever is less frequent, to ensure data are correct and completed? (Section C1-~~3~~1) | | | | | |
| 279 | Do procedures ensure that all applicable project-level signatory releases and DQOs (Section C3-~~11~~3) as specified in the WAP are performed? (Section C3-~~10b~~4b) | | | | | |
| 282 | At the data generation level, do procedures ensure that all electronic and video data stored appropriately to ensure that waste container, sample, and associated QA data are readily retrievable? Are radiography tapes reviewed, at a frequency of one waste container per day or once per testing batch, whichever is less frequent, against the data reported on the radiography form? (Section C3-~~10a~~4a, C3-~~10a~~4a(1)) | | | | | |
| 283 | At the project level, do procedures require the Site Project Manager to certify that the radiography data are complete and acceptable based on the videotape review of at least one waste container per testing batch or daily, whichever is less frequent? (Section C3-~~10b~~4b(1)) | | | | | |

1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.

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~~**Table C6-6 Visual Examination (VE) Checklist**~~

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## Table C6-4 Visual Examination (VE) Checklist

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Training** | | | | | |
| 296 | Is there documentation which shows that a standardized training program for visual examination operators has been developed? Is it specific to the site and include the various waste configurations generated/stored at the site? (Section C1-~~4~~2) | | | | | |
| 297 | Is there documentation which shows that the visual examination operators receive training on the specific waste generating processes, typical packaging configurations, and waste material parameters expected to be found in each Waste Matrix Code at the site? (Section C1-~~4~~2) | | | | | |
| 298 | Are the visual examination personnel requalified once every two years? (Section C1-~~4~~2) | | | | | |
| 298a | Does the training include the following regardless of Summary Category Group?<br>• Identifying and describing the contents of a waste container by examining all items in waste containers of previously packaged waste.<br>• Identifying when VE cannot be used to meet the DQOs,<br>(Section C1-~~4~~2) | | | | | |
| | **Visual Examination Expert Requirements** | | | | | |
| 300 | Does documentation ensure that the site has designated a visual examination expert? Is the visual examination expert familiar with the waste generating processes that have taken place at the site? Is the visual examination expert familiar with all of the types of waste being characterized at that site? (Section C1-~~4~~2) | | | | | |
| 301 | Does documentation ensure that the visual examination expert shall be responsible for the overall~~-t~~ direction and implementation of the visual examination aspects of the program? Does the site's QAPjP specify the selection, qualification, and training requirements of the visual examination expert? (Section C1-~~4~~2) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Visual Examination Procedures** | | | | | |
| 304 | Do procedures indicate that all visual examination activities are documented on video/audio media or VE performed by using a second operator to provide additional verification by reviewing the contents of the waste container to ensure correct reporting? (Section C1-~~4~~2) | | | | | |
| 304a | Are procedures in place to ensure that when VE is performed using a second operator, each operator performing VE shall observe for themselves the waste being placed in the container or the contents within the examined waste container when waste is not removed? (Section C1-~~4~~2) | | | | | |
| 313 | Do site procedures ensure that when liquid is found, the non-transparent internal container holding the liquid will be assumed to be filled with liquid and this volume will be added to the total liquid in the container being characterized using VE? The container being characterized using VE would then be rejected and/or repackaged to exclude the internal container if it is over the TSDF-WAC limits. (Section C-~~3c~~3b) | | | | | |

| | WAP Requirement[1] | Procedure Documented | | Example of Implementation/ Objective Evidence, as applicable | | Comment (e.g., any change in procedure since last audit, etc.) |
|---|---|---|---|---|---|---|
| | | Location | Adequate? Y/N (Why?) | Item Reviewed | Adequate? Y/N | |
| | **Quality Assurance Objectives** | | | | | |
| 314 | Are process procedures in place to meet the following Quality Assurance Objectives?<br>Precision<br>• Precision is maintained by reconciling any discrepancies between the operator and the independent technical reviewer with regard to identification of waste matrix code, liquids in excess of TSDF-WAC limits, and compressed gases.<br>Accuracy<br>• Accuracy is maintained by requiring operators to pass a comprehensive examination and demonstrate satisfactory performance in the presence of the VE expert during their initial qualification and subsequent requalification.<br>Completeness<br>• A validated VE data form will be obtained for 100 percent of the waste containers subject to VE.<br>Comparability<br>• The comparability of VE data from different operators shall be enhanced by using standardized VE procedures and operator qualifications.<br>(Section C3-~~4b~~2b) | | | | | |

1. The WAP requirements should be presented in documents, such as procedures. Each of the questions posed under WAP requirements are meant to determine whether procedures are in place or whether documents are evident which demonstrate that the specific WAP requirement is or can be met.

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# ATTACHMENT C7

# TRU WASTE CONFIRMATION

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# ATTACHMENT C7

# TRU WASTE CONFIRMATION

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Figure C7-1 Overview of Waste Confirmation

# ATTACHMENT C7

# TRU WASTE CONFIRMATION

## Introduction

The Permittees demonstrate compliance with the Permit by ensuring that the waste characterization processes performed by generator/storage sites (**sites**) produce data compliant with the WAP and through the waste screening and verification processes. Verification occurs at three levels: 1) the data generation level, 2) the project level, and 3) the Permittee level. The Permittees also examine a representative subpopulation of waste prior to shipment to confirm that the waste contains no ignitable, corrosive or reactive waste; and that assigned Environmental Protection Agency (**EPA**) hazardous waste numbers are allowed by the Permit. The waste confirmation activities described herein occur prior to shipment of the waste from the generator/storage site to WIPP.

## C7-1 Permittee Confirmation of TRU Mixed Waste

Waste confirmation is defined in Part 1 as the activities performed by the Permittees or the co-Permittee the U.S. Department of Energy (**DOE**), pursuant to this Permit Attachment, to satisfy the requirements specified in Section 310 of Pub. L. 108-447. Waste confirmation occurs after waste containers have been certified for disposal at WIPP. The general confirmation process for WIPP waste is presented in Figure C7-1.

### C7-1a Confirmation of a Representative Subpopulation of the Waste

The Permittees shall confirm that the waste contains no ignitable, corrosive, or reactive waste through radiography (Section C7-1b) or the use of visual examination (Section C7-1c) of a statistically representative subpopulation of the waste. Prior to shipment to WIPP, waste confirmation will be performed on randomly selected containers from each CH and RH TRU mixed waste stream shipment. Figure C7-1 presents the overall waste verification and confirmation process.

Waste confirmation encompasses ensuring that the physical characteristics of the TRU mixed waste correspond with its waste stream description and that the waste does not contain liquid in excess of TSDF-WAC limits or compressed gases. These techniques can detect liquid that exceeds 1 percent volume of the container and containerized gases, which are prohibited from storage or disposal at the WIPP facility. The prohibition of liquid in excess of TSDF-WAC limits and containerized gases prevents the storage or disposal of ignitable, corrosive, or reactive wastes. Radiography and/or visual examination will ensure that the physical form of the waste matches its waste stream description (i.e., Homogeneous Solids, Soil/Gravel, or Debris Waste). The results of waste confirmation activities, including radiography and visual examination records (data sheets, packaging logs, and/or video and audio recordings) will be maintained in the WIPP facility operating record. Noncompliant waste identified during waste confirmation will be managed as described in Section C7-2.

The Permittees shall randomly select at least 7 percent of each waste stream shipment for waste confirmation. This equates to a minimum of one container from each fourteen containers in each waste stream in each designated shipment. If there are less than fourteen containers

from a waste stream in a particular shipment, a minimum of one container from the waste stream shipped will be selected. If the random selection of containers in a shipment occurs prior to loading the waste containers into the Shipping Package, the randomly selected containers may be consolidated into a single Type B package consistent with transportation requirements. Documentation of the random selection of containers for waste confirmation will be placed in the WIPP facility operating record.

For each container selected for confirmation in accordance with the process above, the Permittees will examine the respective nonconformance report (**NCR**) documentation to verify NCRs have been dispositioned for the selected container as required by Permit Attachment C3, Section C3-13.

C7-1a(1) Confirmation Training Requirements

Waste confirmation may be completed by performing actual radiography/visual examination on the waste container(s) or by a review of radiography/visual examination media and records.

Waste confirmation personnel may be trained to either review of radiography/visual examination media and records (Level 1) or to perform actual radiography/visual examination on the waste container(s) (Level 2). Level 2 personnel may also perform waste confirmation by review of media and records.

C7-1b Radiography Methods Requirements

Radiography has been developed by the Permittees specifically to aid in the examination and identification of containerized waste. The Permittees shall describe all activities required to achieve the radiography objectives in standard operating procedures (**SOPs**). These SOPs shall include instructions specific to the radiography system(s) used by the Permittees at an off-site facility (e.g., the generator/storage site). For example, to detect liquid, some systems require the container to be rotated back and forth while other systems require the container to be tilted.

A radiography system (e.g., real time radiography, digital radiography/computed tomography) normally consists of an X-ray-producing device, an imaging system, an enclosure for radiation protection, a waste container handling system, a video and audio recording system, and an operator control and data acquisition station. Although these six components are required, it is expected there will be some variation within a given component between radiography systems. The radiography system shall have controls or an equivalent process which allow the operator to control image quality. On some radiography systems, it should be possible to vary the voltage, typically between 150 to 400 kilovolts (**kV**), to provide an optimum degree of penetration through the waste. For example, high-density material should be examined with the X-ray device set on the maximum voltage. This ensures maximum penetration through the waste container. Low-density material should be examined at lower voltage settings to improve contrast and image definition. The imaging system typically utilizes either a fluorescent screen and a low-light television camera or x-ray detectors to generate the image.

To perform radiography, the waste container is scanned while the operator views the television screen. A video and audio recording is made of the waste container scan and is maintained in the WIPP facility operating record as a non-permanent record. A radiography data form is also used to document the Waste Matrix Code, ensure that the waste container contains no ignitable, corrosive, or reactive waste by documenting the absence of liquid in excess of TSDF-

WAC limits or compressed gases, and verify that the physical form of the waste is consistent with the waste stream description documented on the WSPF. Containers whose contents prevent full examination of the remaining contents shall be subject to visual examination unless the Permittees certify that visual examination would provide no additional relevant information for that container based on the acceptable knowledge information for the waste stream. Such certification shall be documented in the WIPP facility operating record.

For containers that have been characterized using radiography by the generator/storage sites in accordance with the method in Attachment C1, Section C1-3, the Permittees may perform confirmation by review of the generator/storage site's radiography audio/video recordings.

For containers which contain classified shapes and undergo radiography, the radiography will occur at a facility with appropriate security provisions and the video and audio recording will be considered classified. The radiography data forms will not contain classified information.

C7-1b(1) Radiography Training

The radiography system involves qualitative and semiquantitative evaluations of visual displays. Operator training and experience are the most important considerations for ensuring quality controls in regard to the operation of the radiography system and for interpretation and disposition of radiography results. Only trained personnel shall be allowed to operate radiography equipment.

The Permittee radiography operators performing waste confirmation shall be trained in accordance with the requirements of Permit Attachment F1.

C7-1b(2) Radiography Oversight

The Permittees shall be responsible for monitoring the quality of the radiography data and calling for corrective action, when necessary.

A training drum with internal containers of various sizes shall be scanned biennially by each Level 2 operator. The video and audio media shall then be reviewed by a radiography subject matter expert to ensure that operators' interpretations remain consistent and accurate. Imaging system characteristics shall be verified on a routine basis.

Independent replicate scans and replicate observations of the video output of the radiography process shall be performed under uniform conditions and procedures. Independent replicate scans shall be performed on one waste container per day or once per shipment, whichever is less frequent. Independent observations of one scan (not the replicate scan) shall also be made once per day or once per shipment, whichever is less frequent, by a qualified radiography operator other than the individual who performed the first examination. When confirmation is performed by review of audio/video recorded scans produced by the generator/storage site as specified in Permit Attachment C1, Section C1-1, independent observations shall be performed on two waste containers per shipment or two containers per day, whichever is less frequent.

C7-1c Visual Examination Methods Requirements

Visual examination (**VE**) may also be used as a waste confirmation method. VE shall be conducted by the Permittees in accordance with written SOPs to describe the contents of a

waste container. Visual examination shall be conducted to identify and describe all waste items, packaging materials, and waste material parameters. VE may be used to examine a statistically representative subpopulation of the waste certified for shipment to WIPP to confirm that the waste contains no ignitable, corrosive, or reactive waste. This is achieved by confirming that the waste contains no liquid in excess of TSDF-WAC limits or compressed gases, and that the physical form of the waste matches the waste stream description documented on the WSPF. During packaging, the waste container contents are directly examined by trained personnel. This form of waste confirmation may be performed by the Permittees at a generator/storage site. The VE may be documented on video and audio media, or by using a second operator to provide additional verification by reviewing the contents of the waste container to ensure correct reporting. When VE is performed using a second operator, each operator performing the VE shall observe for themselves the waste being placed in the waste container or the contents within the examined waste container when waste is not removed. The results of all VE shall be documented on VE data forms, which are used to document (1) the Waste Matrix Code, (2) that the waste container contains no ignitable, corrosive, or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and (3) that the physical form of the waste is consistent with the waste stream description documented on the WSPF.

In order to keep radiation doses as low as reasonably achievable at generator/storage sites, the Permittees may use their own trained VE operators to perform VE for waste confirmation by reviewing generator/storage site VE data, which includes VE data forms, waste packaging records, and may also include audio/video media. The Permittees shall document their review of generator/storage site VE data on confirmation data forms.

If the generator/storage site documented VE using audio/video media in accordance with Permit Attachment C1, Section C1-2, the Permittees must use the audio/video media to perform confirmation. If the Permittees perform waste confirmation by review of audio/video media, the audio/video record of the VE must be sufficiently complete for the Permittees to confirm the Waste Matrix Code and waste stream description, and verify the waste contains no liquid in excess of TSDF-WAC limits or compressed gases. Generator/storage site VE video/audio media subject to review by the Permittees shall meet the following minimum requirements:

- The video/audio media shall record the waste packaging event for the container such that all waste items placed into the container are recorded in sufficient detail and shall contain an inventory of waste items in sufficient detail that a trained Permittee VE operator can identify the associated waste material parameter.

- The video/audio media shall capture the waste container identification number.

- The personnel loading the waste container shall be identified on the video/audio media or on packaging records traceable to the loading of the waste container.

- The date of loading of the waste container will be recorded on the video/audio media or on packaging records traceable to the loading of the waste container.

VE audio/video media of containers that contain classified shapes shall be considered classified information.

If the generator/storage site did not document VE using audio/video media, the Permittees may use their own trained VE operators to perform VE for waste confirmation by reviewing VE data forms or packaging records prepared by the generator/storage site. To be acceptable, the generator/storage site VE data forms or packaging records must be signed by two generator/storage site personnel who witnessed the packaging of the waste and must provide sufficient information for the Permittees to determine that the waste container contents match the waste stream description on the WSPF and the waste contains no liquids in excess of TSDF-WAC limits or compressed gases. Generator/storage site VE forms or packaging records subject to review by the Permittees shall meet the following minimum requirements:

- At least two generator site personnel shall approve the data forms or packaging records attesting to the contents of the waste container.
- The data forms or packaging records shall contain an inventory of waste items in sufficient detail that a trained Permittee VE operator can identify the associated waste material parameters.
- The waste container identification number shall be recorded on the data forms or packaging records.

Visual examination video media of containers which contain classified shapes shall be considered classified information. Visual examination data forms will not contain classified information.

C7-1c(1) Visual Examination Training

The Permittees ‘s VE operators performing waste confirmation shall be trained in accordance with the requirements of Permit Attachment F1.

C7-1c(2) Visual Examination Oversight

The Permittees shall designate at least one VE expert. The VE expert shall be familiar with the processes that were used to generate the waste streams being confirmed using VE. The VE expert shall be responsible for the overall direction and implementation of the Permittees ‘s VE program. The Permittees shall specify the selection, qualification, and training requirements of the visual examination expert in an SOP.

C7-1d Quality Assurance Objectives (**QAOs**) for Radiography and Visual Examination

The QAOs the Permittees must meet for radiography and visual examination are detailed in this section. If the QAOs described below are not met, then corrective action as specified in Permit Attachment C3, Section C3-7 shall be taken.

C7-1d(1) Radiography QAOs

The QAOs for radiography are detailed in this section. If the QAOs described below are not met, then corrective action shall be taken.

Data to meet these objectives must be obtained from a video and audio recorded scan provided by trained radiography operators. Results must also be recorded on a radiography data form.

The precision, accuracy, representativeness, completeness, and comparability objectives for radiography data are presented below.

Precision

Precision is maintained by reconciling any discrepancies between two radiography operators with regard to the waste stream waste confirmation, identification of liquid in excess of TSDF-WAC limits, and identification of compressed gases through independent replicate scans and independent observations.

Accuracy

Accuracy is obtained by using a target to tune the image for maximum sharpness and by requiring operators to successfully identify 100 percent of the required items in a training container during their initial qualification and subsequent requalification.

Representativeness

Representativeness is ensured by performing radiography on a random sample of waste containers from each waste stream in each shipment.

Completeness

A video and audio media recording of the radiography examination and a validated radiography data form will be obtained for 100 percent of the waste containers subject to radiography.

Comparability

The comparability of radiography data from different operators shall be enhanced by using standardized radiography procedures and operator qualifications.

C7-1d(2) Visual Examination QAOs

Results must be recorded on a VE data form. The precision, accuracy, representativeness, completeness, and comparability objectives for VE data are presented below.

Precision

Precision is maintained by reconciling any discrepancies between the operator and the independent technical reviewer with regard to the waste stream waste confirmation, identification of liquid in excess of TSDF-WAC limits, and identification of compressed gases.

Accuracy

Accuracy is maintained by requiring operators to pass a comprehensive examination and demonstrate satisfactory performance in the presence of the VE expert during their initial qualification. VE operators shall be requalified as specified in Permit Attachment F2.

Representativeness

Representativeness is ensured by performing VE on a random sample of waste containers within each waste stream in each shipment.

Completeness

A validated VE data form will be obtained for 100 percent of the waste containers subject to VE.

Comparability

The comparability of VE data from different operators shall be enhanced by using standardized VE procedures and operator qualifications.

## C7-1e Review and Validation of Radiography and Visual Examination Data Used for Waste Examination

This section describes the requirements for review and validation of radiography and VE data by the Permittees.

### C7-1e(1) Independent Technical Review

The radiography and/or VE confirmation data for each shipment shall receive an independent technical review. This review will be performed before the affected waste shipment is shipped to the WIPP facility. The review shall be performed by an individual other than the data generator who is qualified to have performed the work. The review will be performed in accordance with approved Permittee SOPs and will be documented on a review checklist. The reviewer(s) must approve the data as evidenced by signature, and as a consequence, ensure the following:

- Data generation and reduction were conducted in a technically correct manner in accordance with the methods used (procedure with revision). Data were reported in the proper units and correct number of significant figures.

- The data have been reviewed for transcription errors.

- Radiography video and audio media recordings have been reviewed (independent observation) on a waste container basis at a minimum of once per shipment or once per day of operation, whichever is less frequent. The radiography video/audio recording will be reviewed against the data reported on the Permittees ‘s radiography form to ensure that the data are correct and complete. If review of radiography scans recorded by the generator/storage site was used to perform confirmation, two observations must be performed for each shipment or two observations per day, whichever is less frequent.

### C7-1e(2) DOE Management Representative Review

The radiography and/or visual examination data forms and independent technical review checklist (confirmation data package) for each shipment shall receive a DOE management review. This review will be performed before the affected waste shipment is disposed of at the WIPP. The review shall be performed by a designated representative of DOE management. The

review will be performed in accordance with approved DOE SOPs and will be documented on a review checklist. The reviewer(s) must approve the confirmation data package as evidenced by signature, and as a consequence, ensure the following:

- The data are technically reasonable based on the technique used.
- The data have received independent technical review.
- The data indicate that the waste examined contained no ignitable, corrosive, or reactive waste and that the physical form of the waste was consistent with the waste stream description in the WSPF.
- QC checks have been performed (e.g., replicate scans, image quality checks).
- The data meet the established QAOs

Upon completion of the DOE management representative review, the waste confirmation data for the shipment shall be submitted to the WIPP facility operating record as non-permanent records. Waste confirmation data includes radiography and VE data forms, video/audio media, and review checklists.

## C7-2 Noncompliant Waste Identified During Waste Confirmation

If the Permittees identify noncompliant waste during waste confirmation at a generator/storage site (i.e., the waste does not match the waste stream description documented in the WSPF or there is liquid in excess of TSDF-WAC limits or compressed gases) the waste will not be shipped. DOE will suspend further shipments of the affected waste stream and issue a CAR to the generator/storage site. Shipments of affected waste streams shall not resume until the CAR has been closed. NMED will be notified within 24 hours of any suspension of waste stream shipments due to the identification of noncompliant waste during waste confirmation.

As part of the corrective action plan in response to the CAR, the generator/storage site will evaluate whether the waste characterization information documented in the Characterization Information Summary and/or WSPF for the waste stream must be updated because the results of waste confirmation for the waste stream indicated that the TRU mixed waste being examined did not match the waste stream description. The generator/storage site will thoroughly evaluate the potential impacts on waste that has been shipped to WIPP. DOE will evaluate the potential that prohibited items were shipped to WIPP and what remedial actions should occur, if any. The results of these evaluations will be provided to NMED before shipments of affected waste streams resume. If the Characterization Information Summary or WSPF requires revision, shipments of the affected waste stream shall not resume until the revised waste stream waste characterization information has been reviewed and approved by DOE.

If a generator/storage site certifies noncompliant waste more than once during a running 90-day period, DOE will suspend acceptance of that site's waste until DOE finds that all corrective actions have been implemented and the site complies with all applicable requirements of the WAP.

# FIGURES

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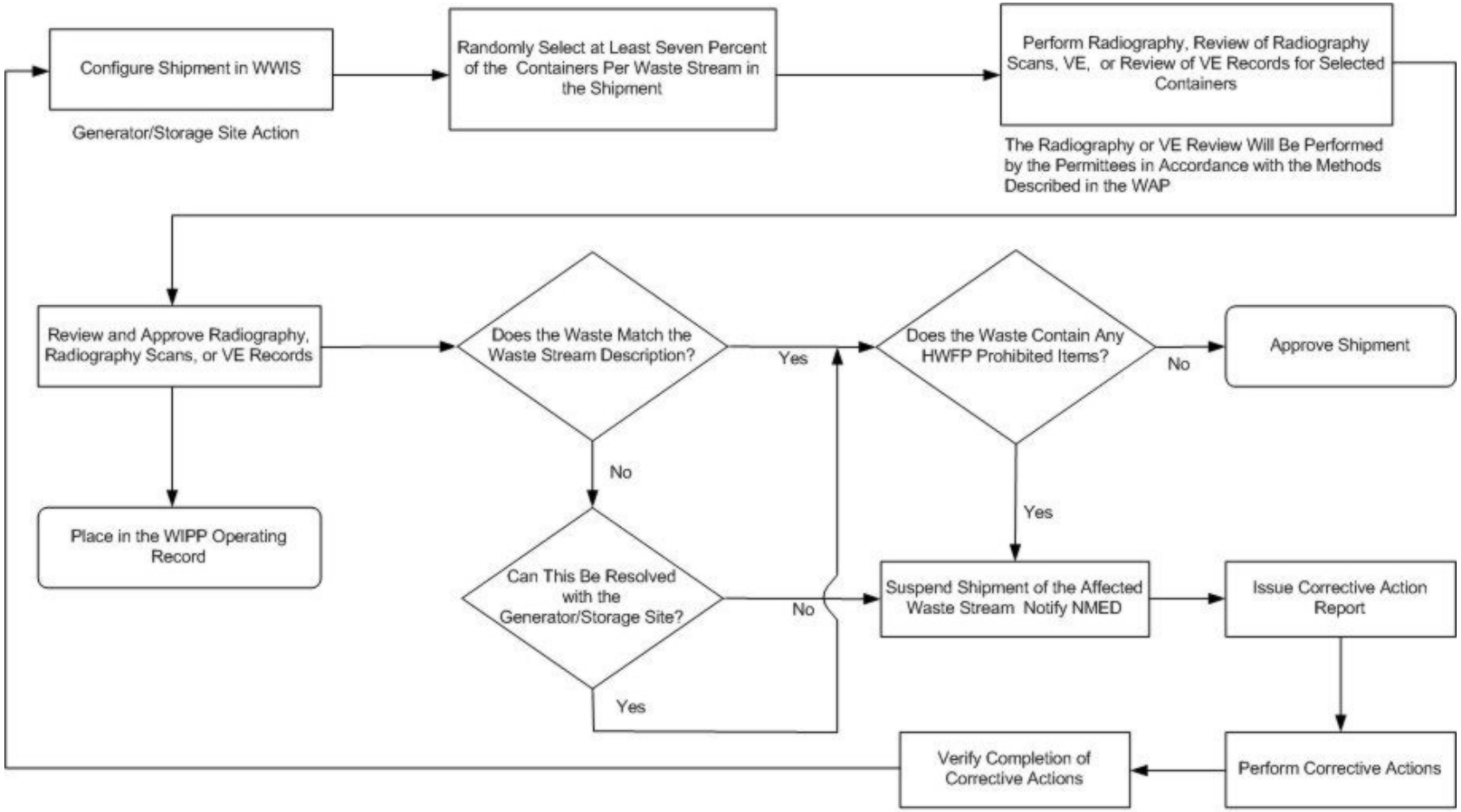


**Figure C7-1**
**Overview of Waste Confirmation**

# ATTACHMENT C7

# TRU WASTE CONFIRMATION

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# ATTACHMENT C7

# TRU WASTE CONFIRMATION

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# ATTACHMENT C7

# TRU WASTE CONFIRMATION

## Introduction

The Permittees demonstrate compliance with the Permit by ensuring that the waste characterization processes performed by generator/storage sites (**sites**) produce data compliant with the WAP and through the waste screening and verification processes. Verification occurs at three levels: 1) the data generation level, 2) the project level, and 3) the Permittee level. The Permittees also examine a representative subpopulation of waste prior to shipment to confirm that the waste contains no ignitable, corrosive or reactive waste; and that assigned Environmental Protection Agency (**EPA**) hazardous waste numbers are allowed by the Permit. The waste confirmation activities described herein occur prior to shipment of the waste from the generator/storage site to WIPP.

## C7-1 Permittee Confirmation of TRU Mixed Waste

Waste confirmation is defined in Part 1 as the activities performed by the Permittees or the co-Permittee the U.S. Department of Energy (**DOE**), pursuant to this Permit Attachment, to satisfy the requirements specified in Section 310 of Pub. L. 108-447. Waste confirmation occurs after waste containers have been certified for disposal at WIPP. The general confirmation process for WIPP waste is presented in Figure C7-1.

### C7-1a Confirmation of a Representative Subpopulation of the Waste

The Permittees shall confirm that the waste contains no ignitable, corrosive, or reactive waste through radiography (Section C7-1b) or the use of visual examination (Section C7-1c) of a statistically representative subpopulation of the waste. Prior to shipment to WIPP, waste confirmation will be performed on randomly selected containers from each CH and RH TRU mixed waste stream shipment. Figure C7-1 presents the overall waste verification and confirmation process.

Waste confirmation encompasses ensuring that the physical characteristics of the TRU mixed waste correspond with its waste stream description and that the waste does not contain liquid in excess of TSDF-WAC limits or compressed gases. These techniques can detect liquid that exceeds 1 percent volume of the container and containerized gases, which are prohibited from storage or disposal at the WIPP facility. The prohibition of liquid in excess of TSDF-WAC limits and containerized gases prevents the storage or disposal of ignitable, corrosive, or reactive wastes. Radiography and/or visual examination will ensure that the physical form of the waste matches its waste stream description (i.e., Homogeneous Solids, Soil/Gravel, or Debris Waste). The results of waste confirmation activities, including radiography and visual examination records (data sheets, packaging logs, and/or video and audio recordings) will be maintained in the WIPP facility operating record. Noncompliant waste identified during waste confirmation will be managed as described in Section C7-2.

The Permittees shall randomly select at least 7 percent of each waste stream shipment for waste confirmation. This equates to a minimum of one container from each fourteen containers in each waste stream in each designated shipment. If there are less than fourteen containers

from a waste stream in a particular shipment, a minimum of one container from the waste stream shipped will be selected. If the random selection of containers in a shipment occurs prior to loading the waste containers into the Shipping Package, the randomly selected containers may be consolidated into a single Type B package consistent with transportation requirements. Documentation of the random selection of containers for waste confirmation will be placed in the WIPP facility operating record.

For each container selected for confirmation in accordance with the process above, the Permittees will examine the respective nonconformance report (**NCR**) documentation to verify NCRs have been dispositioned for the selected container as required by Permit Attachment C3, Section C3-13.

C7-1a(1) Confirmation Training Requirements

Waste confirmation may be completed by performing actual radiography/visual examination on the waste container(s) or by a review of radiography/visual examination media and records.

Waste confirmation personnel may be trained to either review of radiography/visual examination media and records (Level 1) or to perform actual radiography/visual examination on the waste container(s) (Level 2). Level 2 personnel may also perform waste confirmation by review of media and records.

C7-1b Radiography Methods Requirements

Radiography has been developed by the Permittees specifically to aid in the examination and identification of containerized waste. The Permittees shall describe all activities required to achieve the radiography objectives in standard operating procedures (**SOPs**). These SOPs shall include instructions specific to the radiography system(s) used by the Permittees at an off-site facility (e.g., the generator/storage site). For example, to detect liquid, some systems require the container to be rotated back and forth while other systems require the container to be tilted.

A radiography system (e.g., real time radiography, digital radiography/computed tomography) normally consists of an X-ray-producing device, an imaging system, an enclosure for radiation protection, a waste container handling system, a video and audio recording system, and an operator control and data acquisition station. Although these six components are required, it is expected there will be some variation within a given component between radiography systems. The radiography system shall have controls or an equivalent process which allow the operator to control image quality. On some radiography systems, it should be possible to vary the voltage, typically between 150 to 400 kilovolts (**kV**), to provide an optimum degree of penetration through the waste. For example, high-density material should be examined with the X-ray device set on the maximum voltage. This ensures maximum penetration through the waste container. Low-density material should be examined at lower voltage settings to improve contrast and image definition. The imaging system typically utilizes either a fluorescent screen and a low-light television camera or x-ray detectors to generate the image.

To perform radiography, the waste container is scanned while the operator views the television screen. A video and audio recording is made of the waste container scan and is maintained in the WIPP facility operating record as a non-permanent record. A radiography data form is also used to document the Waste Matrix Code, ensure that the waste container contains no ignitable, corrosive, or reactive waste by documenting the absence of liquid in excess of TSDF-

WAC limits or compressed gases, and verify that the physical form of the waste is consistent with the waste stream description documented on the WSPF. Containers whose contents prevent full examination of the remaining contents shall be subject to visual examination unless the Permittees certify that visual examination would provide no additional relevant information for that container based on the acceptable knowledge information for the waste stream. Such certification shall be documented in the WIPP facility operating record.

For containers that have been characterized using radiography by the generator/storage sites in accordance with the method in Attachment C1, Section C1-3, the Permittees may perform confirmation by review of the generator/storage site's radiography audio/video recordings.

For containers which contain classified shapes and undergo radiography, the radiography will occur at a facility with appropriate security provisions and the video and audio recording will be considered classified. The radiography data forms will not contain classified information.

C7-1b(1) Radiography Training

The radiography system involves qualitative and semiquantitative evaluations of visual displays. Operator training and experience are the most important considerations for ensuring quality controls in regard to the operation of the radiography system and for interpretation and disposition of radiography results. Only trained personnel shall be allowed to operate radiography equipment.

The Permittee radiography operators performing waste confirmation shall be trained in accordance with the requirements of Permit Attachment F1.

C7-1b(2) Radiography Oversight

The Permittees shall be responsible for monitoring the quality of the radiography data and calling for corrective action, when necessary.

A training drum with internal containers of various sizes shall be scanned biennially by each Level 2 operator. The video and audio media shall then be reviewed by a radiography subject matter expert to ensure that operators' interpretations remain consistent and accurate. Imaging system characteristics shall be verified on a routine basis.

Independent replicate scans and replicate observations of the video output of the radiography process shall be performed under uniform conditions and procedures. Independent replicate scans shall be performed on one waste container per day or once per shipment, whichever is less frequent. Independent observations of one scan (not the replicate scan) shall also be made once per day or once per shipment, whichever is less frequent, by a qualified radiography operator other than the individual who performed the first examination. When confirmation is performed by review of audio/video recorded scans produced by the generator/storage site as specified in Permit Attachment C1, Section C1-~~3~~1, independent observations shall be performed on two waste containers per shipment or two containers per day, whichever is less frequent.

C7-1c Visual Examination Methods Requirements

Visual examination (**VE**) may also be used as a waste confirmation method. VE shall be conducted by the Permittees in accordance with written SOPs to describe the contents of a

waste container. Visual examination shall be conducted to identify and describe all waste items, packaging materials, and waste material parameters. VE may be used to examine a statistically representative subpopulation of the waste certified for shipment to WIPP to confirm that the waste contains no ignitable, corrosive, or reactive waste. This is achieved by confirming that the waste contains no liquid in excess of TSDF-WAC limits or compressed gases, and that the physical form of the waste matches the waste stream description documented on the WSPF. During packaging, the waste container contents are directly examined by trained personnel. This form of waste confirmation may be performed by the Permittees at a generator/storage site. The VE may be documented on video and audio media, or by using a second operator to provide additional verification by reviewing the contents of the waste container to ensure correct reporting. When VE is performed using a second operator, each operator performing the VE shall observe for themselves the waste being placed in the waste container or the contents within the examined waste container when waste is not removed. The results of all VE shall be documented on VE data forms, which are used to document (1) the Waste Matrix Code, (2) that the waste container contains no ignitable, corrosive, or reactive waste by documenting the absence of liquids in excess of TSDF-WAC limits or compressed gases, and (3) that the physical form of the waste is consistent with the waste stream description documented on the WSPF.

In order to keep radiation doses as low as reasonably achievable at generator/storage sites, the Permittees may use their own trained VE operators to perform VE for waste confirmation by reviewing generator/storage site VE data, which includes VE data forms, waste packaging records, and may also include audio/video media. The Permittees shall document their review of generator/storage site VE data on confirmation data forms.

If the generator/storage site documented VE using audio/video media in accordance with Permit Attachment C1, Section C1-~~4~~2, the Permittees must use the audio/video media to perform confirmation. If the Permittees perform waste confirmation by review of audio/video media, the audio/video record of the VE must be sufficiently complete for the Permittees to confirm the Waste Matrix Code and waste stream description, and verify the waste contains no liquid in excess of TSDF-WAC limits or compressed gases. Generator/storage site VE video/audio media subject to review by the Permittees shall meet the following minimum requirements:

- The video/audio media shall record the waste packaging event for the container such that all waste items placed into the container are recorded in sufficient detail and shall contain an inventory of waste items in sufficient detail that a trained Permittee VE operator can identify the associated waste material parameter.

- The video/audio media shall capture the waste container identification number.

- The personnel loading the waste container shall be identified on the video/audio media or on packaging records traceable to the loading of the waste container.

- The date of loading of the waste container will be recorded on the video/audio media or on packaging records traceable to the loading of the waste container.

VE audio/video media of containers that contain classified shapes shall be considered classified information.

If the generator/storage site did not document VE using audio/video media, the Permittees may use their own trained VE operators to perform VE for waste confirmation by reviewing VE data forms or packaging records prepared by the generator/storage site. To be acceptable, the generator/storage site VE data forms or packaging records must be signed by two generator/storage site personnel who witnessed the packaging of the waste and must provide sufficient information for the Permittees to determine that the waste container contents match the waste stream description on the WSPF and the waste contains no liquids in excess of TSDF-WAC limits or compressed gases. Generator/storage site VE forms or packaging records subject to review by the Permittees shall meet the following minimum requirements:

- At least two generator site personnel shall approve the data forms or packaging records attesting to the contents of the waste container.
- The data forms or packaging records shall contain an inventory of waste items in sufficient detail that a trained Permittee VE operator can identify the associated waste material parameters.
- The waste container identification number shall be recorded on the data forms or packaging records.

Visual examination video media of containers which contain classified shapes shall be considered classified information. Visual examination data forms will not contain classified information.

C7-1c(1) Visual Examination Training

The Permittees ‘s VE operators performing waste confirmation shall be trained in accordance with the requirements of Permit Attachment F1.

C7-1c(2) Visual Examination Oversight

The Permittees shall designate at least one VE expert. The VE expert shall be familiar with the processes that were used to generate the waste streams being confirmed using VE. The VE expert shall be responsible for the overall direction and implementation of the Permittees ‘s VE program. The Permittees shall specify the selection, qualification, and training requirements of the visual examination expert in an SOP.

C7-1d Quality Assurance Objectives (**QAOs**) for Radiography and Visual Examination

The QAOs the Permittees must meet for radiography and visual examination are detailed in this section. If the QAOs described below are not met, then corrective action as specified in Permit Attachment C3, Section C3-~~13~~ 7 shall be taken.

C7-1d(1) Radiography QAOs

The QAOs for radiography are detailed in this section. If the QAOs described below are not met, then corrective action shall be taken.

Data to meet these objectives must be obtained from a video and audio recorded scan provided by trained radiography operators. Results must also be recorded on a radiography data form.

The precision, accuracy, representativeness, completeness, and comparability objectives for radiography data are presented below.

Precision

Precision is maintained by reconciling any discrepancies between two radiography operators with regard to the waste stream waste confirmation, identification of liquid in excess of TSDF-WAC limits, and identification of compressed gases through independent replicate scans and independent observations.

Accuracy

Accuracy is obtained by using a target to tune the image for maximum sharpness and by requiring operators to successfully identify 100 percent of the required items in a training container during their initial qualification and subsequent requalification.

Representativeness

Representativeness is ensured by performing radiography on a random sample of waste containers from each waste stream in each shipment.

Completeness

A video and audio media recording of the radiography examination and a validated radiography data form will be obtained for 100 percent of the waste containers subject to radiography.

Comparability

The comparability of radiography data from different operators shall be enhanced by using standardized radiography procedures and operator qualifications.

C7-1d(2) Visual Examination QAOs

Results must be recorded on a VE data form. The precision, accuracy, representativeness, completeness, and comparability objectives for VE data are presented below.

Precision

Precision is maintained by reconciling any discrepancies between the operator and the independent technical reviewer with regard to the waste stream waste confirmation, identification of liquid in excess of TSDF-WAC limits, and identification of compressed gases.

Accuracy

Accuracy is maintained by requiring operators to pass a comprehensive examination and demonstrate satisfactory performance in the presence of the VE expert during their initial qualification. VE operators shall be requalified as specified in Permit Attachment F2.

Representativeness

Representativeness is ensured by performing VE on a random sample of waste containers within each waste stream in each shipment.

Completeness

A validated VE data form will be obtained for 100 percent of the waste containers subject to VE.

Comparability

The comparability of VE data from different operators shall be enhanced by using standardized VE procedures and operator qualifications.

C7-1e Review and Validation of Radiography and Visual Examination Data Used for Waste Examination

This section describes the requirements for review and validation of radiography and VE data by the Permittees.

C7-1e(1) Independent Technical Review

The radiography and/or VE confirmation data for each shipment shall receive an independent technical review. This review will be performed before the affected waste shipment is shipped to the WIPP facility. The review shall be performed by an individual other than the data generator who is qualified to have performed the work. The review will be performed in accordance with approved Permittee SOPs and will be documented on a review checklist. The reviewer(s) must approve the data as evidenced by signature, and as a consequence, ensure the following:

- Data generation and reduction were conducted in a technically correct manner in accordance with the methods used (procedure with revision). Data were reported in the proper units and correct number of significant figures.

- The data have been reviewed for transcription errors.

- Radiography video and audio media recordings have been reviewed (independent observation) on a waste container basis at a minimum of once per shipment or once per day of operation, whichever is less frequent. The radiography video/audio recording will be reviewed against the data reported on the Permittees ‘s radiography form to ensure that the data are correct and complete. If review of radiography scans recorded by the generator/storage site was used to perform confirmation, two observations must be performed for each shipment or two observations per day, whichever is less frequent.

C7-1e(2) DOE Management Representative Review

The radiography and/or visual examination data forms and independent technical review checklist (confirmation data package) for each shipment shall receive a DOE management review. This review will be performed before the affected waste shipment is disposed of at the WIPP. The review shall be performed by a designated representative of DOE management. The

review will be performed in accordance with approved DOE SOPs and will be documented on a review checklist. The reviewer(s) must approve the confirmation data package as evidenced by signature, and as a consequence, ensure the following:

- The data are technically reasonable based on the technique used.
- The data have received independent technical review.
- The data indicate that the waste examined contained no ignitable, corrosive, or reactive waste and that the physical form of the waste was consistent with the waste stream description in the WSPF.
- QC checks have been performed (e.g., replicate scans, image quality checks).
- The data meet the established QAOs

Upon completion of the DOE management representative review, the waste confirmation data for the shipment shall be submitted to the WIPP facility operating record as non-permanent records. Waste confirmation data includes radiography and VE data forms, video/audio media, and review checklists.

## C7-2 Noncompliant Waste Identified During Waste Confirmation

If the Permittees identify noncompliant waste during waste confirmation at a generator/storage site (i.e., the waste does not match the waste stream description documented in the WSPF or there is liquid in excess of TSDF-WAC limits or compressed gases) the waste will not be shipped. DOE will suspend further shipments of the affected waste stream and issue a CAR to the generator/storage site. Shipments of affected waste streams shall not resume until the CAR has been closed. NMED will be notified within 24 hours of any suspension of waste stream shipments due to the identification of noncompliant waste during waste confirmation.

As part of the corrective action plan in response to the CAR, the generator/storage site will evaluate whether the waste characterization information documented in the Characterization Information Summary and/or WSPF for the waste stream must be updated because the results of waste confirmation for the waste stream indicated that the TRU mixed waste being examined did not match the waste stream description. The generator/storage site will thoroughly evaluate the potential impacts on waste that has been shipped to WIPP. DOE will evaluate the potential that prohibited items were shipped to WIPP and what remedial actions should occur, if any. The results of these evaluations will be provided to NMED before shipments of affected waste streams resume. If the Characterization Information Summary or WSPF requires revision, shipments of the affected waste stream shall not resume until the revised waste stream waste characterization information has been reviewed and approved by DOE.

If a generator/storage site certifies noncompliant waste more than once during a running 90-day period, DOE will suspend acceptance of that site's waste until DOE finds that all corrective actions have been implemented and the site complies with all applicable requirements of the WAP.

# FIGURES

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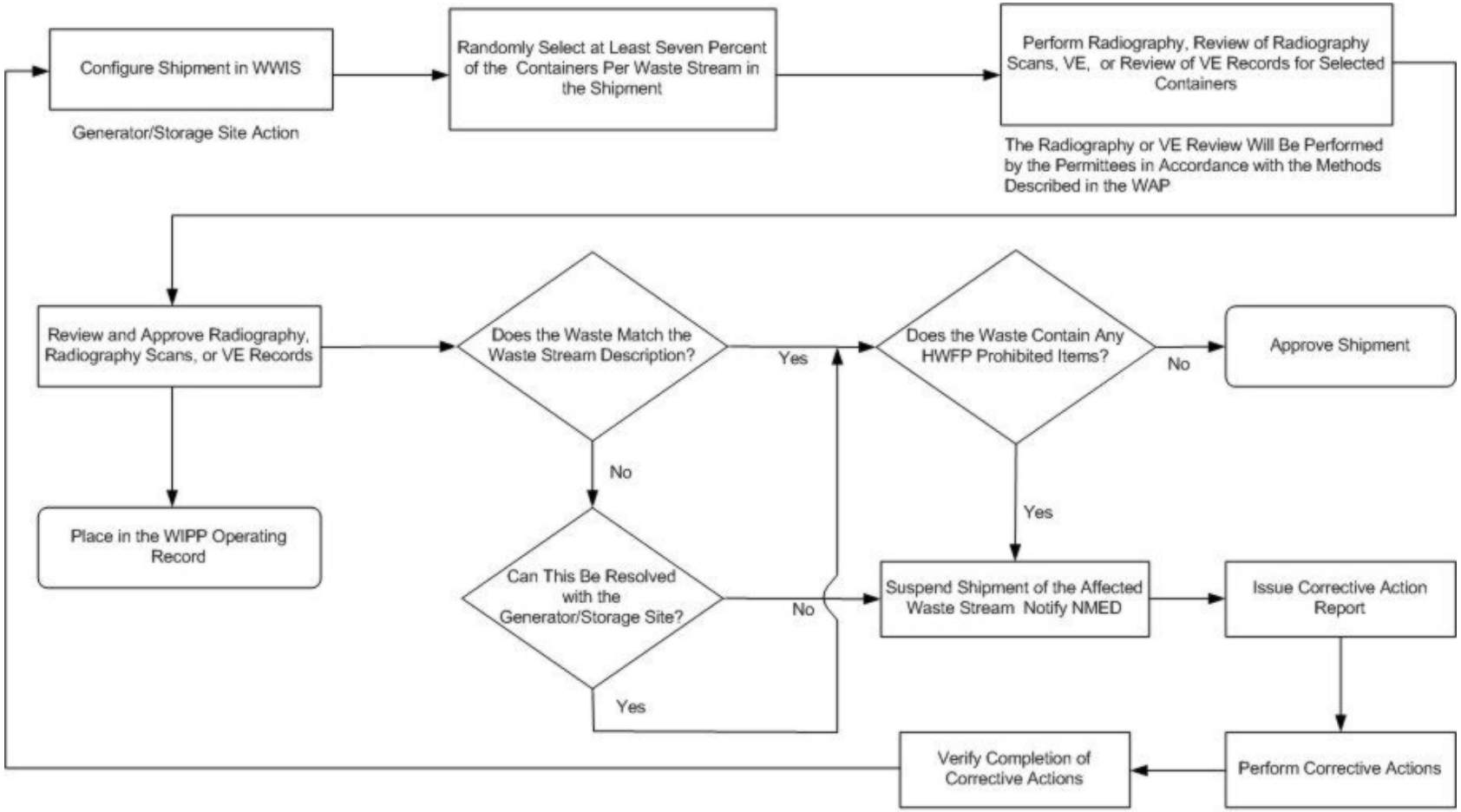


**Figure C7-1**
**Overview of Waste Confirmation**

# PART 2 - GENERAL FACILITY CONDITIONS

## 2.1. DESIGN AND OPERATION OF FACILITY

The Permittees shall design, construct, maintain, and operate WIPP to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of transuranic (**TRU**) mixed waste or mixed waste constituents to air, soil, groundwater, or surface water which could threaten human health or the environment, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.31).

## 2.2. WASTE SOURCES

### 2.2.1. Off-site Wastes

The Permittees may receive off-site TRU mixed waste in compliance with the requirements and conditions specified in this Permit. The Permittees may only receive TRU mixed waste from those sites which comply with the applicable requirements of the Waste Analysis Plan (**WAP**) specified in Permit Section 2.3.1 and Permit Attachment C, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.13(a)) and as verified through the Audit and Surveillance Program specified in Permit Section 2.3.2.

### 2.2.2. Required Notification to Off-Site Sources

Before the Permittees receive TRU mixed waste from an off-site source for the first time, they shall inform the generator/storage site in writing that they have the appropriate Permits for, and will accept, the waste the generator/storage site is shipping. The Permittees shall keep a copy of this written notice as part of the operating record, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.12(b)).

## 2.3. GENERAL WASTE ANALYSIS

### 2.3.1. Waste Analysis Plan

The Permittees shall not manage, store, or dispose TRU mixed waste at WIPP which fails to meet the characterization requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.13), as specified by this Permit.

The Permittees' WAP, as specified in Permit Attachment C, is approved subject to the following conditions:

#### 2.3.1.1. Implementation of Requirements

i. The Permittees shall require that generator/storage sites implement applicable waste characterization requirements of the WAP, specified in Permit Attachment C, prior to the Permittees' receipt of TRU mixed waste at WIPP.

ii. The Permittees or the co-Permittee DOE shall implement applicable waste confirmation requirements of the WAP, pursuant to Permit Attachment C7 (TRU Waste Confirmation), prior to shipment of TRU mixed waste from generator/storage sites to WIPP.

2.3.1.2. Waste Characterization Testing Methods

The Permittees shall require that generator/storage sites comply with the applicable method requirements, quality control, equipment testing, inspection, maintenance, and equipment calibration and frequency standards for the procedures specified in Permit Attachment C1 (Waste Characterization Testing Methods).

2.3.1.3. Waste Sampling and Analysis Methods

If, at any time prior to shipment of a new waste stream or at the time of review of a revised waste stream profile form, the Secretary or Permittees identify a discrepancy regarding the assignment of hazardous waste numbers not authorized in Permit Table 2.3.4, the Permittees shall require the generator/storage site to perform additional evaluation/characterization of the waste stream that may include chemical sampling and analysis of the waste.

If the Secretary or Permittees determine that additional characterization is necessary using chemical sampling and analysis, the Permittees shall direct the generator/storage site to provide the Permittees with the following documentation:

a) Sampling and analysis plan

b) EPA SW-846 test method(s), or functionally equivalent test method(s), to be used

c) Identification of the laboratory(ies) that will be performing the test(s)

Upon request by the Secretary, the Permittees shall provide such documentation within 30 days after receipt from the generator.

Upon the Permittees written approval of the sampling and analysis plan, the generator/storage shall implement the sampling and analysis plan and modify the WSPF as appropriate. The Permittees shall provide copies of the approved plan and the results of all analyses to the NMED per Permit Attachment C, Section C-5a.

2.3.1.4. Quality Assurance Objectives

The Permittees shall require that all waste characterization activities used by generator/storage sites comply with the appropriate quality assurance objectives (**QAOs**) specified in Permit Attachment C3 (Quality Assurance Objectives and Data Validation Techniques for Waste Characterization Methods). The Permittees shall require generator/storage sites to review, validate, and verify all testing data; reconcile testing results with data quality objectives (**DQOs**); satisfy data reporting requirements; and identify, document, and report all nonconformances and operational variances in compliance with Permit Attachment C3.

2.3.1.5. Acceptable Knowledge

The Permittees shall require generator/storage sites to assemble acceptable knowledge documentation and re-evaluate acceptable knowledge determinations, and shall audit (as specified in Permit Section 2.3.2) all aspects of the acceptable knowledge waste characterization process as specified in Permit Attachment C4 (TRU Mixed Waste Characterization Using Acceptable Knowledge).

2.3.1.6. Quality Assurance

The Permittees shall require each generator/storage site to develop and implement a quality assurance project plan (**QAPjP**) which demonstrates compliance with, and implementation of, applicable requirements of the WAP, Permit Attachment C, as specified in Permit Attachment C5 (Quality Assurance Project Plan Requirements).

2.3.1.7. WIPP Waste Information System (**WWIS**) Database

The Permittees shall provide the Secretary access to the WWIS database as necessary to determine compliance with the WAP. The WWIS shall meet all requirements presented in Section C-5a(1) of the WAP, Permit Attachment C, prior to acceptance of TRU mixed waste. The Secretary's access to the WWIS shall be direct, read-only (via modem or Internet) to all query and reporting functions of the Characterization, Certification, Shipping, and Inventory modules of the WWIS database.

Beginning on December 31, 2005, the Permittees instituted a public database containing certain information from the WWIS. The Permittees shall continue to provide such public access through the WIPP Home Page at <http://www.wipp.energy.gov>.

2.3.2. Audit and Surveillance Program

The Permittees shall not manage, store, or dispose TRU mixed waste at WIPP from a generator/storage site until the following conditions have been met as necessary for the Secretary to determine that the applicable characterization requirements of Permit Section 2.3.1 have been implemented:

2.3.2.1. Requirement to Audit

DOE shall demonstrate to the Secretary that the generator/storage sites have implemented and comply with applicable requirements of the WAP by conducting audits as specified in Permit Attachment C, Section C-5a(3), and Permit Attachment C6 (Audit and Surveillance Program), and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.13).

2.3.2.2. Observation of Audit

The Secretary may observe such audits as necessary to validate the implementation of and compliance with applicable WAP requirements at each generator/storage site. DOE shall provide the Secretary with a current audit schedule on a monthly basis and notify the Secretary no later than 30 calendar days prior to each audit.

2.3.2.3. Final Audit Report

DOE shall provide the Secretary a final audit report as specified in Permit Attachment C6, and post a link to the final audit report transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11. The final audit report shall include all information specified in Permit Attachment C6, Section C6-4, and:

i. A detailed description of all corrective actions and the resolution of any corrective action applicable to WAP requirements, including re-audits if required;

ii. All documentation necessary for the Secretary to determine if the corrective action was resolved.

2.3.2.4. Secretary Notification of Approval

The Secretary shall approve DOE's final audit report by written notification to DOE that the applicable characterization requirements of the WAP at a generator/storage site and have been implemented.

### 2.3.3. Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**)

The Permittees shall not accept TRU mixed wastes at WIPP for storage, management, or disposal which fail to meet the treatment, storage, and disposal facility waste acceptance criteria as presented in Permit Sections 2.3.3.1 through 2.3.3.10 of this Permit.

#### 2.3.3.1. Liquid

Liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable.

- Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination.
- Internal containers with more than 60 milliliters or 3 percent by volume observable liquid, whichever is greater, are prohibited.
- Containers with Hazardous Waste Number U134 (hydrofluoric acid) 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.

#### 2.3.3.2. Pyrophoric Materials

Non-radionuclide pyrophoric materials, such as elemental potassium, are not acceptable at WIPP.

#### 2.3.3.3. Non-mixed Hazardous Wastes

Hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes) are not acceptable at WIPP.

#### 2.3.3.4. Chemical Incompatibility

Wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes are not acceptable at WIPP.

#### 2.3.3.5. Explosives and Compressed Gases

Wastes containing explosives or compressed gases are not acceptable at WIPP.

2.3.3.6. PCB Waste

Wastes with polychlorinated biphenyls (**PCBs**) not authorized under an EPA PCB waste disposal authorization are not acceptable at WIPP.

2.3.3.7. Ignitable, Corrosive, and Reactive Wastes

Wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003) are not acceptable at WIPP.

2.3.3.8. Excluded Waste

TRU mixed waste that has ever been managed as high-level waste and waste from tanks specified in Permit Attachment C are not acceptable at WIPP unless specifically approved through a Class 3 permit modification. Such wastes are listed in Table 2.3.3.8 below.

**Table 2.3.3.8 - Additional Approved Waste Streams**

| Date Class 3 Permit Modification Request Approved | Description of Waste Stream |
|---|---|
| | |
| | |

2.3.3.9. Unconfirmed Waste

Any waste container that has not been subject to confirmation pursuant to Permit Attachment C7 is not acceptable at WIPP. This prohibition shall not apply to waste containers accepted before confirmation activities were required by this Permit.

2.3.3.10. Waste Stream Profiles

Any waste container from a waste stream which has not been preceded by an appropriate, certified Waste Stream Profile Form (Attachment C, Figure C-1) is not acceptable at WIPP.

2.3.4. Permitted TRU Mixed Wastes

The Permittees shall accept containers which contain only those TRU mixed wastes listed in Permit Attachment B (Hazardous Waste Permit Application Part A). Allowable TRU mixed wastes are specified in Table 2.3.4 below. 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:

| Table 2.3.4 – Permitted TRU Mixed Wastes | | |
|---|---|---|
| **EPA Hazardous Waste Number** | **Hazardous Waste[1]** | **Chemical Abstracts Service (CAS) Registry Number** |
| F001 | Spent halogenated solvents: | |
| | Tetrachloroethylene | 127-18-4 |
| | Trichloroethylene | 79-01-6 |
| | Methylene chloride | 75-09-2 |
| | 1,1,1-Trichloroethane | 71-55-6 |
| | Carbon tetrachloride | 56-23-5 |
| | Chlorinated fluorocarbons | NA |
| F002 | Spent halogenated solvents: | |
| | Tetrachloroethylene | 127-18-4 |
| | Methylene chloride | 75-09-2 |
| | Trichloroethylene | 79-01-6 |
| | 1,1,1-Trichloroethane | 71-55-6 |
| | Chlorobenzene | 108-90-7 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 |
| | Ortho-dichlorobenzene | 95-50-1 |
| | Trichlorofluoromethane | 75-69-4 |
| | 1,1,2-Trichloroethane | 79-00-5 |
| F003 | Spent non-halogenated solvents: | |
| | Xylene | 1330-20-7 |
| | Acetone | 67-64-1 |
| | Ethyl acetate | 141-78-6 |
| | Ethyl benzene | 100-41-4 |
| | Ethyl ether | 60-29-7 |
| | Methyl isobutyl ketone | 108-10-1 |
| | n-Butyl alcohol | 71-36-3 |
| | Cyclohexanone | 108-94-1 |
| | Methanol | 67-56-1 |
| F004 | Spent non-halogenated solvents: | |
| | Cresols and cresylic acid | 1319-77-3 |
| | Nitrobenzene | 98-95-3 |

| Table 2.3.4 – Permitted TRU Mixed Wastes | | |
|---|---|---|
| **EPA Hazardous Waste Number** | **Hazardous Waste[1]** | **Chemical Abstracts Service (CAS) Registry Number** |
| F005 | Spent non-halogenated solvents: | |
| | Toluene | 108-88-3 |
| | Methyl ethyl ketone | 78-93-3 |
| | Carbon disulfide | 75-15-0 |
| | Isobutanol | 78-83-1 |
| | Pyridine | 110-86-1 |
| | Benzene | 71-43-2 |
| | 2-Ethoxyethanol | 110-80-5 |
| | 2-Nitropropane | 79-46-9 |
| F006 | Wastewater treatment sludges from electroplating operations: | |
| | Cadmium | 7440-43-9 |
| | Chromium | 7440-47-3 |
| | Cyanide | 57-12-5 |
| | Lead | 7439-92-1 |
| | Nickel | 7440-02-0 |
| | Silver | 7440-22-4 |
| F007 | Spent cyanide plating bath solutions from electroplating operations: | |
| | See F006 | |
| F009 | Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process: | |
| | See F006 | |
| D004 | Arsenic | 7440-38-2 |
| D005 | Barium | 7440-39-3 |
| D006 | Cadmium | 7440-43-9 |
| D007 | Chromium | 7440-47-3 |
| D008 | Lead | 7439-92-1 |
| D009 | Mercury | 7439-97-6 |
| D010 | Selenium | 7782-49-2 |
| D011 | Silver | 7440-22-4 |
| D018 | Benzene | 71-43-2 |

| Table 2.3.4 – Permitted TRU Mixed Wastes | | |
|---|---|---|
| **EPA Hazardous Waste Number** | **Hazardous Waste[1]** | **Chemical Abstracts Service (CAS) Registry Number** |
| D019 | Carbon Tetrachloride | 56-23-5 |
| D021 | Chlorobenzene | 108-90-7 |
| D022 | Chloroform | 67-66-3 |
| D026 | Cresol | 1319-77-3 |
| D027 | 1,4-Dichlorobenzene | 106-46-7 |
| D028 | 1,2-Dichloroethane | 107-06-2 |
| D029 | 1,1-Dichloroethylene | 75-35-4 |
| D030 | 2,4-Dinitrotoluene | 121-14-2 |
| D032 | Hexachlorobenzene | 118-74-1 |
| D033 | Hexachlorobutadiene | 87-68-3 |
| D034 | Hexachloroethane | 67-72-1 |
| D035 | Methyl ethyl ketone | 78-93-3 |
| D036 | Nitrobenzene | 98-95-3 |
| D037 | Pentachlorophenol | 87-86-5 |
| D038 | Pyridine | 110-86-1 |
| D039 | Tetrachloroethylene | 127-18-4 |
| D040 | Trichloroethylene | 79-01-6 |
| D043 | Vinyl chloride | 75-01-4 |
| P015 | Beryllium powder (H) | 7440-41-7 |
| P030 | Cyanides (soluble cyanide salts), not otherwise specified (H) | N/A |
| P098 | Potassium Cyanide (H) | 151-50-8 |
| P099 | Potassium Silver Cyanide (H) | 506-61-6 |
| P106 | Sodium Cyanide (H) | 143-33-9 |
| P120 | Vanadium Pentoxide (H) | 1314-62-1 |
| U002 | Acetone (I) | 67-64-1 |
| U003 | Acetonitrile (I,T) | 75-05-8 |

| Table 2.3.4 – Permitted TRU Mixed Wastes | | |
|---|---|---|
| **EPA Hazardous Waste Number** | **Hazardous Waste[1]** | **Chemical Abstracts Service (CAS) Registry Number** |
| U019 | Benzene (I,T) | 71-43-2 |
| U037 | Chlorobenzene (T) | 108-90-7 |
| U043 | Vinyl Chloride (T) | 75-01-4 |
| U044 | Chloroform (T) | 67-66-3 |
| U052 | Cresol (T) | 1319-77-3 |
| U070 | 1,2-Dichlorobenzene (T) | 95-50-1 |
| U072 | 1,4-Dichlorobenzene (T) | 106-46-7 |
| U078 | 1,1-Dichloroethylene (T) | 75-35-4 |
| U079 | 1,2-Dichloroethylene (T) | 156-60-5 |
| U103 | Dimethyl Sulfate (T) | 77-78-1 |
| U105 | 2,4-Dinitrotoluene (T) | 121-14-2 |
| U108 | 1,4-Dioxane (T) | 123-91-1 |
| U122 | Formaldehyde (T) | 50-00-0 |
| U133 | Hydrazine (R,T) | 302-01-2 |
| U134 | Hydrofluoric Acid (C,T) | 7664-39-3 |
| U151 | Mercury (T) | 7439-97-6 |
| U154 | Methanol (I) | 67-56-1 |
| U159 | Methyl Ethyl Ketone (I,T) | 78-93-3 |
| U196 | Pyridine (T) | 110-86-1 |
| U209 | 1,1,2,2-Tetrachloroethane (T) | 79-34-5 |
| U210 | Tetrachloroethylene (T) | 127-18-4 |
| U220 | Toluene (T) | 108-88-3 |
| U226 | 1,1,1-Trichloroethane (T) | 71-55-6 |
| U228 | Trichloroethylene (T) | 79-01-6 |
| U239 | Xylene (I,T) | 1330-20-7 |

[1] Designations in parentheses for P- and U-coded wastes reflect the basis for the listing and are as follows:

H - acute toxicity

T - toxicity

R - reactivity

I - ignitability

C - corrosivity

Acceptance of U-coded wastes listed for reactivity, ignitability, or corrosivity characteristics is contingent upon a demonstration that the wastes meet the requirements specified in Permit Section 2.3.3.7.

### 2.3.5. Derived Waste

Any WIPP-generated waste derived from adequately characterized, WIPP-accepted TRU mixed waste generated at an off-site facility (*derived waste*) does not need to be additionally characterized for hazardous waste components if the Permittees use the generator's characterization data and knowledge of the processes at the WIPP facility to identify and characterize derived waste. Derived waste containers shall be managed according to Permit Attachment A1 (Container Storage), Section A1-1d(1), and meet all TSDF waste acceptance criteria in Permit Section 2.3.3 prior to disposal at WIPP.

## 2.4. WASTE MINIMIZATION PROGRAM

The Permittees shall implement and maintain a waste minimization program to reduce the volume and toxicity of hazardous and mixed wastes generated at the facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73(b)(9)). The waste minimization program shall include proposed, practicable methods of treatment and storage currently available to the Permittees to minimize the present and future threat to human health and the environment. The waste minimization program shall include the following items:

1. Written policies or statements that outline goals, objectives, and methods for source reduction and recycling of hazardous and mixed waste at the facility;

2. Employee training or incentive programs designed to identify and implement source reduction and recycling opportunities for all hazardous and mixed wastes;

3. Source reduction or recycling measures implemented in the last five years or planned for the next federal fiscal year;

4. Estimated dollar amounts of capital expenditures and operating costs devoted to source reduction and recycling of hazardous and mixed waste;

5. Factors which have prevented implementation of source reduction or recycling;

6. Summary of additional waste minimization efforts that could be implemented at the facility that analyzes the potential for reducing the quantity and toxicity of each waste stream through production process changes, production reformulations, recycling, and all other appropriate means including an assessment of the technical feasibility, cost, and potential waste reduction for each option;

7. Flow charts and/or tables summarizing all hazardous and mixed waste streams produced by the facility by quantity, type, building or area, and program; and

8. Demonstration of the need to use those processes which produce a particular hazardous or mixed waste due to a lack of alternative processes, available technology, or available alternative processes that would produce less volume or less toxic waste.

The Permittees shall submit to the Secretary a report regarding progress made in the waste minimization program in the previous year. The report shall address items 1 – 8 above, shall show changes from the previous report, and shall be submitted annually by December 1 for the year ending the previous September 30th.

## 2.5. DUST SUPPRESSION

The Permittees shall not use waste, used oil, or any other material which is contaminated with dioxin, polychlorinated biphenyls (**PCBs**), or any other hazardous waste (other than a waste identified solely on the basis of ignitability), for dust suppression or road treatment, as specified in 20.4.1.700 NMAC (incorporating 40 CFR §266.23(b)).

## 2.6. SECURITY

In order to prevent the unknowing entry, and minimize the possibility of unauthorized entry, of persons or livestock onto the active portion of the facility, the Permittees shall comply with the following security provisions, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.14).

### 2.6.1. 24-Hour Surveillance System

The Permittees shall maintain a 24-hour surveillance system comprised of security officers that provide protection 24 hours per day, every day. Security officers shall continuously monitor and control personnel, vehicle, and material access/egress to the active portion of the facility, known as the Property Protection Area (**PPA**), in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.14(b)(1)).

During non-operational hours, security officers shall conduct documented security patrols outside of the PPA, at a minimum rate of two per 12-hour shift. Whenever scheduled security patrols cannot be made, the reason for missing the patrol shall be documented in the security logbook.

### 2.6.2. Barrier

The PPA shall be enclosed by a permanent seven ft high chain-link fence topped by three strands of barbed wire, for a total height of eight ft. The fence shall completely surround all major surface structures on the active portion of the facility and shall also be inspected as specified in Permit Attachment E to ensure it remains in good repair, in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.14(b)(2)(i)).

### 2.6.3. Means to Control Entry

The Permittees shall control entry to the active portion of the facility at all times, in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.14(b)(2)(ii)). Entry into the

PPA, whether by personnel or vehicles, shall be through controlled gates and doors. Only properly identified and authorized persons, vehicles, and property shall be allowed entrance to and exit from the active portion of the facility. Security shall require employees to identify themselves with an identification badge when entering or leaving the premises, and shall require visitors to show proper authorization prior to allowing them to enter the active portion of the facility. Visitors shall be required to wear an approved badge and may require an authorized escort.

For the purposes of entry control to areas where wastes are managed, stored, or disposed, these areas shall be posted as Controlled Areas, and access shall be limited to trained and qualified individuals and visitors escorted by trained and qualified individuals.

### 2.6.4. Warning Signs

The Permittees shall post “No Trespassing” signs and “Danger: Authorized Personnel Only” signs in English and Spanish at approximately 50 ft intervals on the permanent chain-link fence surrounding the PPA. The signs shall be legible from a distance of 25 ft and shall be visible from any approach to the facility. These same signs, plus security and traffic signs, shall also be located on the controlled gates, in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.14(c)).

## 2.7. GENERAL INSPECTION REQUIREMENTS

### 2.7.1. Inspection Schedule

The Permittees shall implement the inspection schedule specified in Permit Attachment E (Inspection Schedule, Process and Forms) to detect any malfunctions and deteriorations, operator errors, and discharges, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)).

### 2.7.2. Inspection Log Forms

The Permittees shall use the inspection logbooks and forms as specified in Permit Attachment E. Original copies of these completed forms are maintained in the Operating Record. The Permittees shall record the date and time of the inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(d)).

### 2.7.3. Inspection Frequency

The Permittees shall inspect monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment at the frequency specified in Tables E-1 and E-2 of Permit Attachment E, and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)).

#### 2.7.4. Inspection Remediation

The Permittees shall remedy any deterioration or malfunction of equipment or structures which an inspection reveals, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(c)).

#### 2.7.5. Inspection Records

Beginning with the effective date of this Permit, the Permittees shall maintain inspection logbooks and forms in the operating record until closure, as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.15(d) and 264.73(b)(5)).

## 2.8. PERSONNEL TRAINING

The Permittees shall conduct personnel training, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.16).

#### 2.8.1. Personnel Training Content

The personnel training program shall include the requirements specified in Permit Attachment F (Personnel Training) and Permit Attachment F2 (Training Course and Qualification Card Outlines), as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.16).

#### 2.8.2. Personnel Training Requirements

The Permittees shall train all persons involved in the management of mixed and hazardous waste in procedures relevant to the positions in which they are employed, as specified in Permit Attachment F1 (RCRA Hazardous Waste Management Job Titles and Descriptions), and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.16).

#### 2.8.3. Personnel Training Records

The Permittees shall maintain training documents and records, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.16(d) and (e)).

#### 2.8.4. Continuing Training

Unless otherwise specified by this Permit, continuing training required by this Permit on an annual or biennial basis shall be completed by the end of the month of the anniversary date when the training was previously completed.

## 2.9. GENERAL REQUIREMENTS FOR HANDLING IGNITABLE, CORROSIVE, REACTIVE, OR INCOMPATIBLE WASTES

The Permittees shall not manage, store or dispose of ignitable, corrosive, reactive, or incompatible wastes, as defined in 20.4.1.200 NMAC (incorporating 40 CFR §§261.21, 261.22, and 261.23) and 20.4.1.500 NMAC (incorporating 40 CFR §264 Appendix V) within the permitted units. The Permittees shall comply with the procedures to prevent acceptance of ignitable, corrosive, reactive, and incompatible waste specified in Permit Sections 2.3.1 and 2.3.3.

## 2.10. PREPAREDNESS AND PREVENTION

### 2.10.1. Required Equipment

The Permittees shall maintain at the facility the equipment specified in the Contingency Plan, Permit Attachment D (RCRA Contingency Plan), as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32).

#### 2.10.1.1. Internal Communications

The Permittees shall have an internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to facility personnel, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32(a)). The internal communication systems shall include two-way communication by the public address (**PA**) system and its intercom phones and paging channels, an internal telephone system, mine phones, pagers and plectrons, and portable two-way radios. The alarm system shall include local and facility-wide alarm systems.

#### 2.10.1.2. External Communications

The Permittees shall have a communications device or system capable of summoning outside agencies for emergency assistance, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32(b)). The external communication systems shall include the commercial telephone system and two-way radios.

#### 2.10.1.3. Emergency Equipment

The Permittees shall have portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment as described in Permit Attachment D (RCRA Contingency Plan) and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32(c)).

#### 2.10.1.4. Water for Fire Control

The Permittees shall have water at adequate volume and pressure to supply water-hose streams, foam-producing equipment, automatic

sprinklers, or water-spray systems, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32(d)). The WIPP facility water system shall consist of water furnished by the City of Carlsbad capable of providing water at a rate of 6,000 gallons per minute; two water storage tanks, one 180,000-gallon capacity tank for use by the fire-water system and a second tank with a 100,000-gallon reserve; dedicated fire-water pumps rated at 1,500 gallons per minute at 125 pounds per square inch; and a wet-pipe sprinkler system connected to surface buildings as described in Permit Attachment D (RCRA Contingency Plan).

2.10.1.5. Electrical Backup

In case of loss of AC power input to the UPS units, the dedicated batteries were designed to supply power to a fully loaded UPS for 30 minutes. It is expected that the AC power input to the UPS will be restored within 30 minutes, either from the off-site electric utility or from the site back-up power generator system.

The RH Complex is included in the WHB. The Central UPS supplies power to the WHB which includes the RH Complex. The RH Bay, Hot Cell and Transfer Cell equipment are serviced by dual 1,300 KW diesel powered generators located between the exhaust shaft and the WHB. The generators provide backup power to both CH and RH waste handling operations. The RH waste handling equipment is designed to stop as a result of loss of power in a fail-safe condition. Power from the back-up generators may be utilized to place RH TRU mixed waste containers in process into a safe configuration. During a total power outage condition selected RH loads can be powered by the Central UPS. Within a short time selected RH loads at 480 volts and below can be powered by the Backup Diesel Generators. The backup central UPS for the WHB would also supply backup power to the RH Complex.

Human health and the environment are protected during a loss of off-site power by a combination of factors:

i. The underground filtration system fails in the “filter” mode so that no releases of contaminated particulates will occur

ii. The UPS maintains all monitoring systems and alarms in waste handling areas so that fires or pressure loss will be detected and an appropriate response initiated

iii. Generators are brought on line within 30 minutes, at which time hoisting can be initiated so that personnel do not have to stay underground for extended lengths of time.

iv. Decisions to evacuate underground personnel will be made in accordance with the requirements of the Mine Safety and Health Administration (MSHA)

v. The waste hoist brakes set automatically so that loads do not fall

vi. Cranes retain their loads so that spills do not occur from dropped containers

vii. Communication systems are maintained

viii. The emergency operations center is powered if it is needed

2.10.2. Testing and Maintenance of Equipment

The Permittees shall test and maintain the equipment specified in Permit Section 2.10.1, as necessary, to assure its proper operation in time of emergency, as specified in Permit Attachment E and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.33).

2.10.3. Access to Communications or Alarm System

The Permittees shall maintain access to the communications and alarm systems specified in Permit Section 2.10.1, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.34).

2.10.4. Required Aisle Space

The Permittees shall maintain aisle space in the WHB Unit and Parking Area Unit (Part 3) to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.35).

2.10.5. Arrangements with Local Authorities

2.10.5.1. Parties to Arrangements

The Permittees shall maintain preparedness and prevention arrangements with state and local authorities, other mining operations, contractors, and other governmental agencies specified in Permit Attachment D, Section D-6, as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.37(a) and 264.52(c)). If state or local authorities, other mining operations, contractors, or other governmental agencies decline to enter into preparedness and prevention arrangements with the Permittees, the Permittees shall document this refusal in the operating record, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.37(b)).

2.10.5.2. Coordination Agreements

As specified in Section D-6 of Permit Attachment D, these arrangements shall be either Memoranda of Understanding (**MOU**) or Mutual Aid Agreements (**MAA**) between the Permittees and the off-site cooperating agencies, and shall include the elements required by 20.4.1.500 NMAC (incorporating 40 CFR §264.37(a)). Copies and descriptions of these MOUs and agreements shall be maintained at the facility in the operating record.

## 2.11. HAZARDS PREVENTION

The Permittees shall operate the WIPP facility to fully meet each of the requirements of 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(8)), to prevent hazards associated with unloading operations, prevent runoff from hazardous waste handling areas, prevent contamination of water supplies, mitigate the effects of equipment and power failures, prevent undue exposure of personnel to hazardous waste, and prevent releases to the atmosphere, as specified in Permit Attachments A (General Facility Description and Process Information), A1 (Container Storage), and A2 (Geologic Repository).

## 2.12. CONTINGENCY PLAN

### 2.12.1. Implementation of Plan

The Permittees shall immediately implement the Contingency Plan as specified in Permit Attachment D whenever there is a fire, explosion, or release of mixed or hazardous waste or hazardous waste constituents which could threaten human health or the environment, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.51(b)).

### 2.12.2. Copies of Plan

The Permittees shall maintain copies of the Contingency Plan and all revisions and amendments to the Contingency Plan as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.53). The Permittees shall provide copies of the current Contingency Plan to the Secretary and all entities with which the Permittees have emergency MOUs or MAAs, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.53(b)). The Permittees shall maintain at least one current paper copy of the Contingency Plan at the facility in a location readily accessible to the Emergency Coordinator specified in Permit Section 2.12.4.

### 2.12.3. Amendments to Plan

The Permittees shall review and immediately amend, if necessary, the Contingency Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.54).

2.12.4. Emergency Coordinator

An Emergency Coordinator as specified in Table D-2 of Permit Attachment D shall be available at all times in case of an emergency. The Emergency Coordinator shall be thoroughly familiar with the Contingency Plan and shall have the authority to commit the resources needed to implement the Contingency Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.55). In the event of an imminent or actual emergency, the Emergency Coordinator shall implement the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.56).

## 2.13. MANIFEST SYSTEM

The Permittees shall comply with the manifest requirements of 20.4.1.500 NMAC (incorporating 40 CFR §§264.71 and 264.72). The Permittees shall not accept for storage or disposal any mixed waste from an off-site source without an accompanying manifest.

## 2.14. RECORDKEEPING AND REPORTING

In addition to the recordkeeping and reporting requirements specified elsewhere in this Permit, the Permittees shall comply with the following conditions:

2.14.1. Operating Record

The Permittees shall maintain a written operating record at the facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73(a)). The written operating record shall include all information required under 20.4.1.500 NMAC (incorporating 40 CFR §264.73(b)) subject to the limitations on the storage of classified information as discussed in Permit Attachment C. Unless specifically prohibited by this Permit, an electronic record that cannot be altered by the user and capable of producing a paper copy shall be deemed to be a written record. The Permittees shall maintain the operating record until closure of the facility.

2.14.2. Biennial Report

The Permittees shall submit to the Secretary a biennial report, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.75).

# PERMIT ATTACHMENTS

Permit Attachment A (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “General Facility Description and Process Information” - Chapter A and “Information for Specific Units - Chapter M)

Permit Attachment A1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Container Storage - Appendix M1)

Permit Attachment A2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Geologic Repository - Appendix M2)

Permit Attachment B (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Part A Application”).

Permit Attachment C (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Waste Analysis Plan” - Chapter B).

Permit Attachment C1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Waste Characterization Sampling Methods” - Appendix B1).

Permit Attachment C3 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Quality Assurance Objectives and Data Validation Techniques for Waste Characterization Sampling and Analytical Methods” - Appendix B3).

Permit Attachment C4 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “TRU Waste Characterization Using Acceptable Knowledge” - Appendix B4).

Permit Attachment C5 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Quality Assurance Project Plan Requirements” - Appendix B5).

Permit Attachment C6 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Waste Isolation Pilot Plant DOE Audit and Surveillance Program” - Appendix B6).

Permit Attachment C7 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Permittee Level TRU Waste Confirmation Processes” - Appendix B7).

Permit Attachment D (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “RCRA Contingency Plan” - Chapter F).

Permit Attachment E (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Inspection Schedule, Process and Forms” - Chapter D).

Permit Attachment F (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Personnel Training” - Chapter H).

Permit Attachment F1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “RCRA Hazardous Waste Management Job Titles and Descriptions” - Appendix H1).

Permit Attachment F2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Training Course and Qualification Card Outlines” - Appendix H2).

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# PART 2 - GENERAL FACILITY CONDITIONS

## 2.1. DESIGN AND OPERATION OF FACILITY

The Permittees shall design, construct, maintain, and operate WIPP to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of transuranic (**TRU**) mixed waste or mixed waste constituents to air, soil, groundwater, or surface water which could threaten human health or the environment, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.31).

## 2.2. WASTE SOURCES

### 2.2.1. Off-site Wastes

The Permittees may receive off-site TRU mixed waste in compliance with the requirements and conditions specified in this Permit. The Permittees may only receive TRU mixed waste from those sites which comply with the applicable requirements of the Waste Analysis Plan (**WAP**) specified in Permit Section 2.3.1 and Permit Attachment C, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.13(a)) and as verified through the Audit and Surveillance Program specified in Permit Section 2.3.2.

### 2.2.2. Required Notification to Off-Site Sources

Before the Permittees receive TRU mixed waste from an off-site source for the first time, they shall inform the generator/storage site in writing that they have the appropriate Permits for, and will accept, the waste the generator/storage site is shipping. The Permittees shall keep a copy of this written notice as part of the operating record, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.12(b)).

## 2.3. GENERAL WASTE ANALYSIS

### 2.3.1. Waste Analysis Plan

The Permittees shall not manage, store, or dispose TRU mixed waste at WIPP which fails to meet the characterization requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.13), as specified by this Permit.

The Permittees' WAP, as specified in Permit Attachment C, is approved subject to the following conditions:

#### 2.3.1.1. Implementation of Requirements

i. The Permittees shall require that generator/storage sites implement applicable waste characterization requirements of the WAP, specified in Permit Attachment C, prior to the Permittees' receipt of TRU mixed waste at WIPP.

ii. The Permittees or the co-Permittee DOE shall implement applicable waste confirmation requirements of the WAP, pursuant to Permit Attachment C7 (TRU Waste Confirmation), prior to shipment of TRU mixed waste from generator/storage sites to WIPP.

2.3.1.2. Waste Characterization ~~Sampling~~ Testing ~~and Analytical~~ Methods

The Permittees shall require that generator/storage sites ~~and DOE approved laboratories~~ comply with the applicable method requirements, quality control, equipment testing, inspection, maintenance, and equipment calibration and frequency standards for the procedures specified in Permit Attachment C1 (Waste Characterization ~~Sampling~~ Testing Methods)~~. For all analytical methods for waste analysis not otherwise specified in Permit Attachment C1, the Permittees shall require the generator/storage sites and DOE approved laboratories to use "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*", EPA Publication SW-846. Updates to EPA Publication SW-846 shall be incorporated into this permit by reference. Sites may use these new or revised methods once they have demonstrated that the results from the new methods will be at least equivalent to the results from the currently~~ used methods.

2.3.1.3. ~~Statistical~~ Waste ~~Methods used in~~ Sampling and Analysis Methods

If, at any time prior to shipment of a new waste stream or at the time of review of a revised waste stream profile form, the Secretary or Permittees identify a discrepancy regarding the assignment of hazardous waste numbers not authorized in Permit Table 2.3.4, the Permittees shall require the generator/storage site to perform additional evaluation/characterization of the waste stream that may include chemical sampling and analysis of the waste.

If the Secretary or Permittees determine that additional characterization is necessary using chemical sampling and analysis, the Permittees shall direct the generator/storage site to provide the Permittees with the following documentation:

a) Sampling and analysis plan

b) EPA SW-846 test method(s), or functionally equivalent test method(s), to be used

c) Identification of the laboratory(ies) that will be performing the test(s)

Upon request by the Secretary, the Permittees shall provide such documentation within 30 days after receipt from the generator.

Upon the Permittees written approval of the sampling and analysis plan, the generator/storage shall implement the sampling and analysis plan and modify the WSPF as appropriate. The Permittees shall provide copies of the approved plan and the results of all analyses to the NMED per Permit Attachment C, Section C-5a.

~~The Permittees shall require that generator/storage sites use the methods for statistically selecting retrievably stored and newly generated TRU mixed waste containers for volatile organic compounds (**VOC**s), semivolatile organic compounds (**SVOC**s), and total metals analysis, and establishing upper confidence limits, as specified in Permit Attachment C2 (Statistical Methods Used in Sampling and Analysis).~~

2.3.1.4. Quality Assurance Objectives

The Permittees shall require that all waste characterization activities used by generator/storage sites ~~and DOE approved laboratories~~ comply with the appropriate quality assurance objectives (**QAOs**) specified in Permit Attachment C3 (Quality Assurance Objectives and Data Validation Techniques for Waste Characterization ~~Sampling and Analytical~~ Methods). The Permittees shall require generator/storage sites to review, validate, and verify all ~~analytical~~ testing data; reconcile ~~analytical~~ testing results with data quality objectives (**DQOs**); satisfy data reporting requirements; and identify, document, and report all nonconformances and operational variances in compliance with Permit Attachment C3.

2.3.1.5. Acceptable Knowledge

The Permittees shall require generator/storage sites to assemble acceptable knowledge documentation and re-evaluate acceptable knowledge determinations, and shall audit (as specified in Permit Section 2.3.2) all aspects of the acceptable knowledge waste characterization process as specified in Permit Attachment C4 (TRU Mixed Waste Characterization Using Acceptable Knowledge).

2.3.1.6. Quality Assurance

The Permittees shall require each generator/storage site ~~and DOE approved laboratory~~ to develop and implement a quality assurance project plan (**QAPjP**) which demonstrates compliance with, and implementation of, applicable requirements of the WAP, Permit Attachment C, as specified in Permit Attachment C5 (Quality Assurance Project Plan Requirements).

2.3.1.7. WIPP Waste Information System (**WWIS**) Database

The Permittees shall provide the Secretary access to the WWIS database as necessary to determine compliance with the WAP. The WWIS shall meet all requirements presented in Section C-5a(1) of the WAP, Permit Attachment C, prior to acceptance of TRU mixed waste. The Secretary's access to the WWIS shall be direct, read-only (via modem or Internet) to all query and reporting functions of the Characterization, Certification, Shipping, and Inventory modules of the WWIS database.

Beginning on December 31, 2005, the Permittees instituted a public database containing certain information from the WWIS. The Permittees shall continue to provide such public access through the WIPP Home Page at <http://www.wipp.energy.gov>.

2.3.2. Audit and Surveillance Program

The Permittees shall not manage, store, or dispose TRU mixed waste at WIPP from a generator/storage site until the following conditions have been met as necessary for the Secretary to determine that the applicable characterization requirements of Permit Section 2.3.1 have been implemented:

2.3.2.1. Requirement to Audit

DOE shall demonstrate to the Secretary that the generator/storage sites ~~and DOE approved laboratories~~ have implemented and comply with applicable requirements of the WAP by conducting audits as specified in Permit Attachment C, Section C-5a(3), and Permit Attachment C6 (Audit and Surveillance Program), and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.13).

2.3.2.2. Observation of Audit

The Secretary may observe such audits as necessary to validate the implementation of and compliance with applicable WAP requirements at each generator/storage site ~~and DOE approved laboratory~~. DOE shall provide the Secretary with a current audit schedule on a monthly basis and notify the Secretary no later than 30 calendar days prior to each audit.

2.3.2.3. Final Audit Report

DOE shall provide the Secretary a final audit report as specified in Permit Attachment C6, and post a link to the final audit report transmittal letter on the WIPP Home Page and inform those on the e-mail notification list as specified in Permit Section 1.11. The final audit report shall include all information specified in Permit Attachment C6, Section C6-4, and:

i. A detailed description of all corrective actions and the resolution of any corrective action applicable to WAP requirements, including re-audits if required;

ii. All documentation necessary for the Secretary to determine if the corrective action was resolved.

2.3.2.4. Secretary Notification of Approval

The Secretary shall approve DOE's final audit report by written notification to DOE that the applicable characterization requirements of the WAP at a generator/storage site ~~and or DOE approved laboratory~~ have been implemented.

2.3.3. Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (**TSDF-WAC**)

The Permittees shall not accept TRU mixed wastes at WIPP for storage, management, or disposal which fail to meet the treatment, storage, and disposal facility waste acceptance criteria as presented in Permit Sections 2.3.3.1 through 2.3.3.10 of this Permit.

2.3.3.1. Liquid

Liquid waste is not acceptable at WIPP. Liquid in the quantities delineated below is acceptable.

- Observable liquid shall be no more than 1 percent by volume of the outermost container at the time of radiography or visual examination.
- Internal containers with more than 60 milliliters or 3 percent by volume observable liquid, whichever is greater, are prohibited.
- Containers with Hazardous Waste Number U134 (hydrofluoric acid) 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.

2.3.3.2. Pyrophoric Materials

Non-radionuclide pyrophoric materials, such as elemental potassium, are not acceptable at WIPP.

2.3.3.3. Non-mixed Hazardous Wastes

Hazardous wastes not occurring as co-contaminants with TRU wastes (non-mixed hazardous wastes) are not acceptable at WIPP.

2.3.3.4. Chemical Incompatibility

Wastes incompatible with backfill, seal and panel closures materials, container and packaging materials, shipping container materials, or other wastes are not acceptable at WIPP.

2.3.3.5. Explosives and Compressed Gases

Wastes containing explosives or compressed gases are not acceptable at WIPP.

2.3.3.6. PCB Waste

Wastes with polychlorinated biphenyls (**PCBs**) not authorized under an EPA PCB waste disposal authorization are not acceptable at WIPP.

2.3.3.7. Ignitable, Corrosive, and Reactive Wastes

Wastes exhibiting the characteristic of ignitability, corrosivity, or reactivity (EPA Hazardous Waste Numbers of D001, D002, or D003) are not acceptable at WIPP.

2.3.3.8. Excluded Waste

TRU mixed waste that has ever been managed as high-level waste and waste from tanks specified in Permit Attachment C are not acceptable at WIPP unless specifically approved through a Class 3 permit modification. Such wastes are listed in Table 2.3.3.8 below.

**Table 2.3.3.8 - Additional Approved Waste Streams**

| Date Class 3 Permit Modification Request Approved | Description of Waste Stream |
|---|---|
| | |
| | |

2.3.3.9. Unconfirmed Waste

Any waste container that has not been subject to confirmation pursuant to Permit Attachment C7 is not acceptable at WIPP. This prohibition shall not apply to waste containers accepted before confirmation activities were required by this Permit.

2.3.3.10. Waste Stream Profiles

Any waste container from a waste stream which has not been preceded by an appropriate, certified Waste Stream Profile Form (Attachment C, Figure C-1) is not acceptable at WIPP.

2.3.4. Permitted TRU Mixed Wastes

The Permittees shall accept containers which contain only those TRU mixed wastes listed in Permit Attachment B (Hazardous Waste Permit Application Part A). Allowable TRU mixed wastes are specified in Table 2.3.4 below. 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:

**Table 2.3.4 – Permitted TRU Mixed Wastes**

| EPA Hazardous Waste Number | Hazardous Waste[1] | Chemical Abstracts Service (CAS) Registry Number |
|---|---|---|
| F001 | Spent halogenated solvents: | |
| | Tetrachloroethylene | 127-18-4 |
| | Trichloroethylene | 79-01-6 |
| | Methylene chloride | 75-09-2 |
| | 1,1,1-Trichloroethane | 71-55-6 |
| | Carbon tetrachloride | 56-23-5 |
| | Chlorinated fluorocarbons | NA |
| F002 | Spent halogenated solvents: | |
| | Tetrachloroethylene | 127-18-4 |
| | Methylene chloride | 75-09-2 |
| | Trichloroethylene | 79-01-6 |
| | 1,1,1-Trichloroethane | 71-55-6 |
| | Chlorobenzene | 108-90-7 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 |
| | Ortho-dichlorobenzene | 95-50-1 |
| | Trichlorofluoromethane | 75-69-4 |
| | 1,1,2-Trichloroethane | 79-00-5 |

| Table 2.3.4 – Permitted TRU Mixed Wastes | | |
|---|---|---|
| **EPA Hazardous Waste Number** | **Hazardous Waste[1]** | **Chemical Abstracts Service (CAS) Registry Number** |
| F003 | Spent non-halogenated solvents: | |
| | Xylene | 1330-20-7 |
| | Acetone | 67-64-1 |
| | Ethyl acetate | 141-78-6 |
| | Ethyl benzene | 100-41-4 |
| | Ethyl ether | 60-29-7 |
| | Methyl isobutyl ketone | 108-10-1 |
| | n-Butyl alcohol | 71-36-3 |
| | Cyclohexanone | 108-94-1 |
| | Methanol | 67-56-1 |
| F004 | Spent non-halogenated solvents: | |
| | Cresols and cresylic acid | 1319-77-3 |
| | Nitrobenzene | 98-95-3 |
| F005 | Spent non-halogenated solvents: | |
| | Toluene | 108-88-3 |
| | Methyl ethyl ketone | 78-93-3 |
| | Carbon disulfide | 75-15-0 |
| | Isobutanol | 78-83-1 |
| | Pyridine | 110-86-1 |
| | Benzene | 71-43-2 |
| | 2-Ethoxyethanol | 110-80-5 |
| | 2-Nitropropane | 79-46-9 |
| F006 | Wastewater treatment sludges from electroplating operations: | |
| | Cadmium | 7440-43-9 |
| | Chromium | 7440-47-3 |
| | Cyanide | 57-12-5 |
| | Lead | 7439-92-1 |
| | Nickel | 7440-02-0 |
| | Silver | 7440-22-4 |
| F007 | Spent cyanide plating bath solutions from electroplating operations: | |
| | See F006 | |

| Table 2.3.4 – Permitted TRU Mixed Wastes | | |
|---|---|---|
| **EPA Hazardous Waste Number** | **Hazardous Waste[1]** | **Chemical Abstracts Service (CAS) Registry Number** |
| F009 | Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process:<br>See F006 | |
| D004 | Arsenic | 7440-38-2 |
| D005 | Barium | 7440-39-3 |
| D006 | Cadmium | 7440-43-9 |
| D007 | Chromium | 7440-47-3 |
| D008 | Lead | 7439-92-1 |
| D009 | Mercury | 7439-97-6 |
| D010 | Selenium | 7782-49-2 |
| D011 | Silver | 7440-22-4 |
| D018 | Benzene | 71-43-2 |
| D019 | Carbon Tetrachloride | 56-23-5 |
| D021 | Chlorobenzene | 108-90-7 |
| D022 | Chloroform | 67-66-3 |
| D026 | Cresol | 1319-77-3 |
| D027 | 1,4-Dichlorobenzene | 106-46-7 |
| D028 | 1,2-Dichloroethane | 107-06-2 |
| D029 | 1,1-Dichloroethylene | 75-35-4 |
| D030 | 2,4-Dinitrotoluene | 121-14-2 |
| D032 | Hexachlorobenzene | 118-74-1 |
| D033 | Hexachlorobutadiene | 87-68-3 |
| D034 | Hexachloroethane | 67-72-1 |
| D035 | Methyl ethyl ketone | 78-93-3 |
| D036 | Nitrobenzene | 98-95-3 |
| D037 | Pentachlorophenol | 87-86-5 |

| Table 2.3.4 – Permitted TRU Mixed Wastes | | |
|---|---|---|
| **EPA Hazardous Waste Number** | **Hazardous Waste[1]** | **Chemical Abstracts Service (CAS) Registry Number** |
| D038 | Pyridine | 110-86-1 |
| D039 | Tetrachloroethylene | 127-18-4 |
| D040 | Trichloroethylene | 79-01-6 |
| D043 | Vinyl chloride | 75-01-4 |
| P015 | Beryllium powder (H) | 7440-41-7 |
| P030 | Cyanides (soluble cyanide salts), not otherwise specified (H) | N/A |
| P098 | Potassium Cyanide (H) | 151-50-8 |
| P099 | Potassium Silver Cyanide (H) | 506-61-6 |
| P106 | Sodium Cyanide (H) | 143-33-9 |
| P120 | Vanadium Pentoxide (H) | 1314-62-1 |
| U002 | Acetone (I) | 67-64-1 |
| U003 | Acetonitrile (I,T) | 75-05-8 |
| U019 | Benzene (I,T) | 71-43-2 |
| U037 | Chlorobenzene (T) | 108-90-7 |
| U043 | Vinyl Chloride (T) | 75-01-4 |
| U044 | Chloroform (T) | 67-66-3 |
| U052 | Cresol (T) | 1319-77-3 |
| U070 | 1,2-Dichlorobenzene (T) | 95-50-1 |
| U072 | 1,4-Dichlorobenzene (T) | 106-46-7 |
| U078 | 1,1-Dichloroethylene (T) | 75-35-4 |
| U079 | 1,2-Dichloroethylene (T) | 156-60-5 |
| U103 | Dimethyl Sulfate (T) | 77-78-1 |
| U105 | 2,4-Dinitrotoluene (T) | 121-14-2 |
| U108 | 1,4-Dioxane (T) | 123-91-1 |
| U122 | Formaldehyde (T) | 50-00-0 |
| U133 | Hydrazine (R,T) | 302-01-2 |

| Table 2.3.4 – Permitted TRU Mixed Wastes | | |
|---|---|---|
| **EPA Hazardous Waste Number** | **Hazardous Waste[1]** | **Chemical Abstracts Service (CAS) Registry Number** |
| U134 | Hydrofluoric Acid (C,T) | 7664-39-3 |
| U151 | Mercury (T) | 7439-97-6 |
| U154 | Methanol (I) | 67-56-1 |
| U159 | Methyl Ethyl Ketone (I,T) | 78-93-3 |
| U196 | Pyridine (T) | 110-86-1 |
| U209 | 1,1,2,2-Tetrachloroethane (T) | 79-34-5 |
| U210 | Tetrachloroethylene (T) | 127-18-4 |
| U220 | Toluene (T) | 108-88-3 |
| U226 | 1,1,1-Trichloroethane (T) | 71-55-6 |
| U228 | Trichloroethylene (T) | 79-01-6 |
| U239 | Xylene (I,T) | 1330-20-7 |

[1] Designations in parentheses for P- and U-coded wastes reflect the basis for the listing and are as follows:

H - acute toxicity

T - toxicity

R - reactivity

I - ignitability

C - corrosivity

Acceptance of U-coded wastes listed for reactivity, ignitability, or corrosivity characteristics is contingent upon a demonstration that the wastes meet the requirements specified in Permit Section 2.3.3.7.

### 2.3.5. Derived Waste

Any WIPP-generated waste derived from adequately characterized, WIPP-accepted TRU mixed waste generated at an off-site facility (*derived waste*) does not need to be additionally characterized for hazardous waste components if the Permittees use the generator's characterization data and knowledge of the processes at the WIPP facility to identify and characterize derived waste. Derived waste containers shall be managed according to Permit Attachment A1 (Container Storage), Section A1-1d(1), and meet all TSDF waste acceptance criteria in Permit Section 2.3.3 prior to disposal at WIPP.

## 2.4. WASTE MINIMIZATION PROGRAM

The Permittees shall implement and maintain a waste minimization program to reduce the volume and toxicity of hazardous and mixed wastes generated at the facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73(b)(9)). The waste minimization program shall include

proposed, practicable methods of treatment and storage currently available to the Permittees to minimize the present and future threat to human health and the environment. The waste minimization program shall include the following items:

1. Written policies or statements that outline goals, objectives, and methods for source reduction and recycling of hazardous and mixed waste at the facility;

2. Employee training or incentive programs designed to identify and implement source reduction and recycling opportunities for all hazardous and mixed wastes;

3. Source reduction or recycling measures implemented in the last five years or planned for the next federal fiscal year;

4. Estimated dollar amounts of capital expenditures and operating costs devoted to source reduction and recycling of hazardous and mixed waste;

5. Factors which have prevented implementation of source reduction or recycling;

6. Summary of additional waste minimization efforts that could be implemented at the facility that analyzes the potential for reducing the quantity and toxicity of each waste stream through production process changes, production reformulations, recycling, and all other appropriate means including an assessment of the technical feasibility, cost, and potential waste reduction for each option;

7. Flow charts and/or tables summarizing all hazardous and mixed waste streams produced by the facility by quantity, type, building or area, and program; and

8. Demonstration of the need to use those processes which produce a particular hazardous or mixed waste due to a lack of alternative processes, available technology, or available alternative processes that would produce less volume or less toxic waste.

The Permittees shall submit to the Secretary a report regarding progress made in the waste minimization program in the previous year. The report shall address items 1 – 8 above, shall show changes from the previous report, and shall be submitted annually by December 1 for the year ending the previous September 30$^{th}$.

## 2.5. DUST SUPPRESSION

The Permittees shall not use waste, used oil, or any other material which is contaminated with dioxin, polychlorinated biphenyls (**PCBs**), or any other hazardous waste (other than a waste identified solely on the basis of ignitability), for dust suppression or road treatment, as specified in 20.4.1.700 NMAC (incorporating 40 CFR §266.23(b)).

## 2.6. SECURITY

In order to prevent the unknowing entry, and minimize the possibility of unauthorized entry, of persons or livestock onto the active portion of the facility, the Permittees shall comply with the following security provisions, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.14).

### 2.6.1. 24-Hour Surveillance System

The Permittees shall maintain a 24-hour surveillance system comprised of security officers that provide protection 24 hours per day, every day. Security officers shall continuously monitor and control personnel, vehicle, and material access/egress to the active portion of the facility, known as the Property Protection Area (**PPA**), in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.14(b)(1)).

During non-operational hours, security officers shall conduct documented security patrols outside of the PPA, at a minimum rate of two per 12-hour shift. Whenever scheduled security patrols cannot be made, the reason for missing the patrol shall be documented in the security logbook.

### 2.6.2. Barrier

The PPA shall be enclosed by a permanent seven ft high chain-link fence topped by three strands of barbed wire, for a total height of eight ft. The fence shall completely surround all major surface structures on the active portion of the facility and shall also be inspected as specified in Permit Attachment E to ensure it remains in good repair, in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.14(b)(2)(i)).

### 2.6.3. Means to Control Entry

The Permittees shall control entry to the active portion of the facility at all times, in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.14(b)(2)(ii)). Entry into the PPA, whether by personnel or vehicles, shall be through controlled gates and doors. Only properly identified and authorized persons, vehicles, and property shall be allowed entrance to and exit from the active portion of the facility. Security shall require employees to identify themselves with an identification badge when entering or leaving the premises, and shall require visitors to show proper authorization prior to allowing them to enter the active portion of the facility. Visitors shall be required to wear an approved badge and may require an authorized escort.

For the purposes of entry control to areas where wastes are managed, stored, or disposed, these areas shall be posted as Controlled Areas, and access shall be limited to trained and qualified individuals and visitors escorted by trained and qualified individuals.

### 2.6.4. Warning Signs

The Permittees shall post “No Trespassing” signs and “Danger: Authorized Personnel Only” signs in English and Spanish at approximately 50 ft intervals on the permanent chain-link

fence surrounding the PPA. The signs shall be legible from a distance of 25 ft and shall be visible from any approach to the facility. These same signs, plus security and traffic signs, shall also be located on the controlled gates, in compliance with 20.4.1.500 NMAC (incorporating 40 CFR §264.14(c)).

## 2.7. GENERAL INSPECTION REQUIREMENTS

### 2.7.1. Inspection Schedule

The Permittees shall implement the inspection schedule specified in Permit Attachment E (Inspection Schedule, Process and Forms) to detect any malfunctions and deteriorations, operator errors, and discharges, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)).

### 2.7.2. Inspection Log Forms

The Permittees shall use the inspection logbooks and forms as specified in Permit Attachment E. Original copies of these completed forms are maintained in the Operating Record. The Permittees shall record the date and time of the inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(d)).

### 2.7.3. Inspection Frequency

The Permittees shall inspect monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment at the frequency specified in Tables E-1 and E-2 of Permit Attachment E, and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(b)).

### 2.7.4. Inspection Remediation

The Permittees shall remedy any deterioration or malfunction of equipment or structures which an inspection reveals, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.15(c)).

### 2.7.5. Inspection Records

Beginning with the effective date of this Permit, the Permittees shall maintain inspection logbooks and forms in the operating record until closure, as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.15(d) and 264.73(b)(5)).

## 2.8. PERSONNEL TRAINING

The Permittees shall conduct personnel training, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.16).

2.8.1. Personnel Training Content

The personnel training program shall include the requirements specified in Permit Attachment F (Personnel Training) and Permit Attachment F2 (Training Course and Qualification Card Outlines), as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.16).

2.8.2. Personnel Training Requirements

The Permittees shall train all persons involved in the management of mixed and hazardous waste in procedures relevant to the positions in which they are employed, as specified in Permit Attachment F1 (RCRA Hazardous Waste Management Job Titles and Descriptions), and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.16).

2.8.3. Personnel Training Records

The Permittees shall maintain training documents and records, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.16(d) and (e)).

2.8.4. Continuing Training

Unless otherwise specified by this Permit, continuing training required by this Permit on an annual or biennial basis shall be completed by the end of the month of the anniversary date when the training was previously completed.

## 2.9. GENERAL REQUIREMENTS FOR HANDLING IGNITABLE, CORROSIVE, REACTIVE, OR INCOMPATIBLE WASTES

The Permittees shall not manage, store or dispose of ignitable, corrosive, reactive, or incompatible wastes, as defined in 20.4.1.200 NMAC (incorporating 40 CFR §§261.21, 261.22, and 261.23) and 20.4.1.500 NMAC (incorporating 40 CFR §264 Appendix V) within the permitted units. The Permittees shall comply with the procedures to prevent acceptance of ignitable, corrosive, reactive, and incompatible waste specified in Permit Sections 2.3.1 and 2.3.3.

## 2.10. PREPAREDNESS AND PREVENTION

2.10.1. Required Equipment

The Permittees shall maintain at the facility the equipment specified in the Contingency Plan, Permit Attachment D (RCRA Contingency Plan), as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32).

2.10.1.1. Internal Communications

The Permittees shall have an internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to facility personnel, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32(a)). The internal communication systems shall include two-way communication by the public address (**PA**) system and its intercom phones and paging channels, an internal telephone system, mine phones, pagers and plectrons, and portable two-way radios. The alarm system shall include local and facility-wide alarm systems.

2.10.1.2. External Communications

The Permittees shall have a communications device or system capable of summoning outside agencies for emergency assistance, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32(b)). The external communication systems shall include the commercial telephone system and two-way radios.

2.10.1.3. Emergency Equipment

The Permittees shall have portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment as described in Permit Attachment D (RCRA Contingency Plan) and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32(c)).

2.10.1.4. Water for Fire Control

The Permittees shall have water at adequate volume and pressure to supply water-hose streams, foam-producing equipment, automatic sprinklers, or water-spray systems, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.32(d)). The WIPP facility water system shall consist of water furnished by the City of Carlsbad capable of providing water at a rate of 6,000 gallons per minute; two water storage tanks, one 180,000-gallon capacity tank for use by the fire-water system and a second tank with a 100,000-gallon reserve; dedicated fire-water pumps rated at 1,500 gallons per minute at 125 pounds per square inch; and a wet-pipe sprinkler system connected to surface buildings as described in Permit Attachment D (RCRA Contingency Plan).

2.10.1.5. Electrical Backup

In case of loss of AC power input to the UPS units, the dedicated batteries were designed to supply power to a fully loaded UPS for 30 minutes. It is expected that the AC power input to the UPS will be restored within 30 minutes, either from the off-site electric utility or from the site back-up power generator system.

The RH Complex is included in the WHB. The Central UPS supplies power to the WHB which includes the RH Complex. The RH Bay, Hot Cell and Transfer Cell equipment are serviced by dual 1,300 KW diesel powered generators located between the exhaust shaft and the WHB. The generators provide backup power to both CH and RH waste handling operations. The RH waste handling equipment is designed to stop as a result of loss of power in a fail-safe condition. Power from the back-up generators may be utilized to place RH TRU mixed waste containers in process into a safe configuration. During a total power outage condition selected RH loads can be powered by the Central UPS. Within a short time selected RH loads at 480 volts and below can be powered by the Backup Diesel Generators. The backup central UPS for the WHB would also supply backup power to the RH Complex.

Human health and the environment are protected during a loss of off-site power by a combination of factors:

i. The underground filtration system fails in the “filter” mode so that no releases of contaminated particulates will occur

ii. The UPS maintains all monitoring systems and alarms in waste handling areas so that fires or pressure loss will be detected and an appropriate response initiated

iii. Generators are brought on line within 30 minutes, at which time hoisting can be initiated so that personnel do not have to stay underground for extended lengths of time.

iv. Decisions to evacuate underground personnel will be made in accordance with the requirements of the Mine Safety and Health Administration (MSHA)

v. The waste hoist brakes set automatically so that loads do not fall

vi. Cranes retain their loads so that spills do not occur from dropped containers

vii. Communication systems are maintained

viii. The emergency operations center is powered if it is needed

2.10.2. Testing and Maintenance of Equipment

The Permittees shall test and maintain the equipment specified in Permit Section 2.10.1, as necessary, to assure its proper operation in time of emergency, as specified in Permit Attachment E and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.33).

2.10.3. Access to Communications or Alarm System

The Permittees shall maintain access to the communications and alarm systems specified in Permit Section 2.10.1, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.34).

2.10.4. Required Aisle Space

The Permittees shall maintain aisle space in the WHB Unit and Parking Area Unit (Part 3) to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.35).

2.10.5. Arrangements with Local Authorities

2.10.5.1. Parties to Arrangements

The Permittees shall maintain preparedness and prevention arrangements with state and local authorities, other mining operations, contractors, and other governmental agencies specified in Permit Attachment D, Section D-6, as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.37(a) and 264.52(c)). If state or local authorities, other mining operations, contractors, or other governmental agencies decline to enter into preparedness and prevention arrangements with the Permittees, the Permittees shall document this refusal in the operating record, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.37(b)).

2.10.5.2. Coordination Agreements

As specified in Section D-6 of Permit Attachment D, these arrangements shall be either Memoranda of Understanding (**MOU**) or Mutual Aid Agreements (**MAA**) between the Permittees and the off-site cooperating agencies, and shall include the elements required by 20.4.1.500 NMAC (incorporating 40 CFR §264.37(a)). Copies and descriptions of these MOUs and agreements shall be maintained at the facility in the operating record.

## 2.11. HAZARDS PREVENTION

The Permittees shall operate the WIPP facility to fully meet each of the requirements of 20.4.1.900 NMAC (incorporating 40 CFR §270.14(b)(8)), to prevent hazards associated with unloading operations, prevent runoff from hazardous waste handling areas, prevent contamination of water supplies, mitigate the effects of equipment and power failures, prevent undue exposure of personnel to hazardous waste, and prevent releases to the atmosphere, as specified in Permit Attachments A (General Facility Description and Process Information), A1 (Container Storage), and A2 (Geologic Repository).

## 2.12. CONTINGENCY PLAN

### 2.12.1. Implementation of Plan

The Permittees shall immediately implement the Contingency Plan as specified in Permit Attachment D whenever there is a fire, explosion, or release of mixed or hazardous waste or hazardous waste constituents which could threaten human health or the environment, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.51(b)).

### 2.12.2. Copies of Plan

The Permittees shall maintain copies of the Contingency Plan and all revisions and amendments to the Contingency Plan as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.53). The Permittees shall provide copies of the current Contingency Plan to the Secretary and all entities with which the Permittees have emergency MOUs or MAAs, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.53(b)). The Permittees shall maintain at least one current paper copy of the Contingency Plan at the facility in a location readily accessible to the Emergency Coordinator specified in Permit Section 2.12.4.

### 2.12.3. Amendments to Plan

The Permittees shall review and immediately amend, if necessary, the Contingency Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.54).

### 2.12.4. Emergency Coordinator

An Emergency Coordinator as specified in Table D-2 of Permit Attachment D shall be available at all times in case of an emergency. The Emergency Coordinator shall be thoroughly familiar with the Contingency Plan and shall have the authority to commit the resources needed to implement the Contingency Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.55). In the event of an imminent or actual emergency, the Emergency Coordinator shall implement the requirements of 20.4.1.500 NMAC (incorporating 40 CFR §264.56).

## 2.13. MANIFEST SYSTEM

The Permittees shall comply with the manifest requirements of 20.4.1.500 NMAC (incorporating 40 CFR §§264.71 and 264.72). The Permittees shall not accept for storage or disposal any mixed waste from an off-site source without an accompanying manifest.

## 2.14. RECORDKEEPING AND REPORTING

In addition to the recordkeeping and reporting requirements specified elsewhere in this Permit, the Permittees shall comply with the following conditions:

2.14.1. Operating Record

The Permittees shall maintain a written operating record at the facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73(a)). The written operating record shall include all information required under 20.4.1.500 NMAC (incorporating 40 CFR §264.73(b)) subject to the limitations on the storage of classified information as discussed in Permit Attachment C. Unless specifically prohibited by this Permit, an electronic record that cannot be altered by the user and capable of producing a paper copy shall be deemed to be a written record. The Permittees shall maintain the operating record until closure of the facility.

2.14.2. Biennial Report

The Permittees shall submit to the Secretary a biennial report, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.75).

# PERMIT ATTACHMENTS

Permit Attachment A (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "General Facility Description and Process Information" - Chapter A and "Information for Specific Units - Chapter M)

Permit Attachment A1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Container Storage - Appendix M1)

Permit Attachment A2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Geologic Repository - Appendix M2)

Permit Attachment B (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Part A Application").

Permit Attachment C (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Waste Analysis Plan" - Chapter B).

Permit Attachment C1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Waste Characterization Sampling Methods" - Appendix B1).

~~Permit Attachment C2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Statistical Methods Used in Sampling and Analysis" - Appendix B2).~~

Permit Attachment C3 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Quality Assurance Objectives and Data Validation Techniques for Waste Characterization Sampling and Analytical Methods" - Appendix B3).

Permit Attachment C4 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "TRU Waste Characterization Using Acceptable Knowledge" - Appendix B4).

Permit Attachment C5 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Quality Assurance Project Plan Requirements" - Appendix B5).

Permit Attachment C6 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Waste Isolation Pilot Plant DOE Audit and Surveillance Program" - Appendix B6).

Permit Attachment C7 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Permittee Level TRU Waste Confirmation Processes" - Appendix B7).

Permit Attachment D (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "RCRA Contingency Plan" - Chapter F).

Permit Attachment E (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, "Inspection Schedule, Process and Forms" - Chapter D).

Permit Attachment F (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Personnel Training” - Chapter H).

Permit Attachment F1 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “RCRA Hazardous Waste Management Job Titles and Descriptions” - Appendix H1).

Permit Attachment F2 (as modified from WIPP Hazardous Waste Facility Permit Amended Renewal Application, “Training Course and Qualification Card Outlines” - Appendix H2).

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