AMWTP HWMA/RCRA PERMIT

FOR THE

IDAHO NATIONAL LABORATORY

ATTACHMENT 2

Section C

Waste Characterization

Revision Date: June 2018

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WASTE CHARACTERISTICS

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C. WASTE CHARACTERISTICS

This section describes the overall waste characteristics of the MW stored or treated at the MWMUs. The bulk of the waste that is stored at, and forms the feed to the MWMUs is MW. The MWMUs are located at the TSA, which was originally established at the RWMC to provide storage of TRU wastes. Most of the MW managed at the MWMUs is either TRU or αLLW MW. HWNs have been based on "Advanced Mixed Waste Treatment Project Waste Stream Designations," AMWTP-5232-RPT-TRUW-12, (RPT-TRUW-12). The individual waste streams have been grouped into seven debris WGs and four non-debris WGs. The debris WGs are lead/cadmium metal (LCM), uncategorized metal (UM), inorganic nonmetal (INM), graphite (G), filters (F), combustible waste (CW), and heterogeneous debris (HD). The non-debris WGs are SI, SO, SW, and soils. The "Waste Matrix Code Reference Manual," (RPT-TRUW-05) is also provided for reference. Both of these reports are included in the Supplemental Information section of the permit application.

Waste Acceptance Criteria for Existing and Newly-generated Wastes

Only MW with HWNs listed in the Part A Permit Application is accepted for storage or treatment at the MWMUs. Waste containers may be transferred to a WMF-610 and WMF-628 through WMF-635 storage unit even if all WAC for that MWMU are not met, upon concurrence of the Environmental Compliance Manager.

Type II Modules, Type I Module, SWEPP, WMF-636 Pad 2, and AMWTP Outside Storage Area WAC for Existing and AMWTP Newly-Generated Waste

Requirements for the receipt of existing and AMWTP newly-generated waste at the Type II Modules, the Type I Module, SWEPP, WMF-636 Pad 2, and the AMWTP Outside Storage Area from the TSA include the following:

- Containers must be numbered or coded for tracking purposes with a unique barcode identifier linked to the appropriate waste stream information (e.g., IDC) and container-specific information maintained within the Operating Record. Containers that are retrieved unlabeled are accepted after a unique barcode has been applied.
- Waste must not contain known:
  - Explosive or pyrophoric material, except for pyrophoric forms of radionuclides,
  - DOT Class 1 explosives, or

- Reactive metals or forbidden materials per 49 CFR 173.21.

- Waste containers must have a hazardous waste label (if required), container number, and other appropriate markings and labels. Containers with known TSCA-regulated waste (regulated under 40 CFR 761) are identified and marked appropriately.

- The process knowledge, to the extent known, regarding the waste stream is documented in the Operating Record.

For each container received at the Type I Module, the Type II Modules, SWEPP, WMF-636 Pad 2, and the AMWTP Outside Storage Area, the following information is included in the Operating Record:

- Waste stream information (e.g., IDC),
- Known HWNs (may be designated as undetermined), and
- Known retrieval and storage history.

Type II Modules, Type I Module, SWEPP, WMF-636 Pad 2, and the AMWTP Outside Storage Area WAC for Non-AMWTP Newly-Generated Waste

The following WAC apply to non-AMWTP newly-generated waste received at the Type II Modules, the Type I Module, SWEPP, WMF-636 Pad 2, or the AMWTP Outside Storage Area:

- Waste meets the "Type II Modules, Type I Module, SWEPP, WMF-636 Pad 2, and AMWTP Outside Storage Area WAC for Existing and AMWTP Newly-Generated Waste" listed above.
- Off-Site waste shall not be received or stored at WMF-636 Pad 2, unless the waste has been supercompacted in WMF-676.
- The source of the waste is DOE.
- Waste has an identified disposal route. Waste may be accepted if treatment by the AMWTP makes the waste acceptable for disposal.
- Waste containers must have a hazardous waste label (if required), container number, and other appropriate markings and labels. The barcode label is used to access information in the Operating Record regarding the waste container.

WMF-676 WAC for Existing and AMWTP Newly-Generated Waste

The WMF-676 requirements for the receipt of waste include the following:

- Waste must be received from another AMWTP waste management unit.
- Waste must be characterized for identity and quantity of organic and inorganic constituents, and metals. Unknown waste (i.e., waste with unknown IDCs or WGs following RTR examination or waste with known IDCs but unknown HWNs) from the inventory of waste is accepted only if RTR and headspace gas analysis (for drummed waste) have been performed and the waste meets all other applicable WAC.
- Radioassay, weight, and RTR/visual examination results must be completed and entered into the Operating Record prior to receipt at WMF-676. RTR/visual examination results must provide a listing of items that require special handling/removal. These items may include non-vented gas cylinders, containerized free liquids, etc.
- The source of the waste must be DOE.
- Waste is typically packaged in a container no larger than 58.5 in. wide by 76.4 in. high by 96 in. long, with a tolerance of 2 in. in all dimensions to allow for protrusions. Smaller containers and other containers listed in Attachment 1.A may be accepted if all other general and unit-specific container criteria are satisfied, such as good condition, weight, labeling, clean exterior, etc.
- Containers must be numbered or coded for tracking purposes with a unique barcode identifier linked to the appropriate information (e.g., IDC, WG, HWNs) and container-specific information maintained within the Operating Record.
- Presence of free liquids must be identified in the characterization information.
- Waste must not contain known:
  - Explosive or pyrophoric material, except for pyrophoric forms of radionuclides,
  - DOT Class 1 explosives, or
  - Reactive metals or forbidden materials per 49 CFR 173.21.
- Shielded containers are typically not accepted since shielding inhibits RTR from being used for waste verification. Shielded containers may be accepted if visual examination has been performed on the container.
- Ignitability, reactivity, and compatibility evaluations based on existing information (including process knowledge, analytical results, or testing) must be completed prior

to acceptance. If compatibility information is incomplete, additional compatibility evaluations may be performed, as necessary.

- Waste may be either debris or non-debris.
- Wastes shall not be readily capable of detonation or explosive decomposition or reaction at normal pressures and temperatures, or explosive reaction with water.
- Waste must be evaluated for the presence of oxidizers and pyrophoric radionuclides prior to any treatment. Evaluation results shall be documented as part of the Operating Record.
- Containers must have adequate integrity to be able to safely handle the container. Containers must be able to support the weight of the contents when lifted.

For each container received at WMF-676, the following information may be included in the Operating Record:

- An IDC (which may be 000 for unknown wastes) and WG, if known;
- Known HWNs (may be designated as undetermined);
- Characterization results (RTR, assay, weight, headspace gas analysis, if applicable);
- Known retrieval and storage history; and
- Targeted pretreatment/treatment process or processes.

WMF-676 Unit-Specific WAC

The unit-specific WAC for WMF-676 pretreatment/treatment units are provided in the following sections. These unit-specific WAC are in addition to the general WMF-676 WAC listed above.

Box Line WAC

The WMF-676 box line WAC requirements for receiving waste include the following:

- All external features that protrude more than 2 in. from the sides/top of the box that could potentially affect the performance of the variable geometry doors must be removed or modified to allow minimal impact to variable door operations.
- All containers should be: (a) in good condition with no significant visible signs of corrosion or rotting of the metal, fiberglass-reinforced plastic, or wood, (b) intact with no holes or splits, (c) externally clean and free of significant loose dust and soil,

(d) presented in the correct orientation with the lid on top, and (e) free from all sharp, significantly protruding objects, such as nails, screws, etc.

- If a container is not in good condition (e.g., severe rusting, apparent structural defects) that will impact the ability to safely handle and process the container, then the container must be repaired, repacked, or overpacked prior to acceptance at WMF-676.
- Containers may have bolts or clamps loosened or removed outside of WMF-676 to assist in opening the containers. The lids are not loosened to the extent that containment could be compromised.
- Pressurized fire extinguishers and aerosol canisters may be depressurized in the box lines. Other pressurized containers shall not be depressurized in the box lines.

Drum Repack System WAC

The WMF-676 drum repack system WAC requirements for receiving waste include the following:

- All waste drums must be lidded (lids may be filter vented).
- Prior to receipt at WMF-676, results of headspace gas sampling (if performed) must be recorded in the Operating Record for unknown drums that cannot be assigned IDCs/WGs based on RTR or have known IDCs but unknown HWNs.
- SCW items that are removed in the drum repack system must be entered into the Operating Record for the particular IDC so that future containers with the same IDC are screened for similar SCW items.
- Unknown wastes must be identified as such.
- All drums shall be free of loose significant amounts of soil.
- The base of the drum must not be distorted to such an extent that it rocks significantly when the drum is upright.

Supercompactor WAC

The WMF-676 supercompactor WAC requirements for receiving waste include the following:

- Drums must be 55 gal (or have equivalent dimensions to a 55-gal drum) with a maximum outer diameter of 24.5 $\pm$ 1 in. and a maximum height of 35 $\pm$ 1 in. All drums protrusions, clamp bands, clamping screws, rolling rings, and deformities must

lie within the specified dimensions when the drum is in an upright position. Note: The physical size limitation of downstream process equipment (e.g., gloveboxes, waste handling equipment) prevents containers with sizes above the mentioned limits from entering the supercompactor.

- Waste must be characterized with respect to IDC/WG and/or HWNs. Drums of ROW are the only containers that do not require assigned HWNs prior to supercompaction.
- The base of a drum must not be distorted to such an extent that it significantly rocks when the drum is upright.
- Drums must not contain any of the following additional prohibited materials: free liquids, as determined by RTR to be in excess of 5% of the waste volume and non-vented gas cylinders or fire extinguishers. RTR results and/or visual examination results for drums must be recorded in the Operating Record.
- Pressurized aerosol canisters may be depressurized in the supercompactor.

SCW Glovebox System WAC

The WMF-676 SCW glovebox system WAC requirements for receiving waste include the following:

- Waste must be received in SCW transfer containers from the pretreatment areas, or be transferred into the glovebox through a bag transfer port.
- Smaller containers of waste within the transfer container must be labeled with unique barcode identifiers, unless the entire contents (multiple items and/or smaller containers) of the transfer container are from a single container.
- Individual items of SCW that are removed in the pretreatment areas must be traceable back to the original container so that the appropriate listed HWNs associated with the original waste can be assigned to the SCW items.
- Wastes that are not characterized with respect to HWNs must be managed as unknown wastes while stored inside the SCW glovebox system (i.e., separated from other wastes) until characterization information is obtained. Characterization information must be entered into the Operating Record and the assigned HWNs updated before wastes are transported to downstream treatment.
- Ignitability, reactivity, and compatibility evaluations based on data obtained from SCW glovebox system operations must be completed prior to downstream treatment, as required.
- Pressurized aerosol canisters may be depressurized in the SCW glovebox system. Other pressurized containers shall not be depressurized in the SCW glovebox system.

WAC for Off-Site Wastes

The following WAC apply to off-Site wastes received at the AMWTP:

- Waste meets the "Type II Module, Type I Module, SWEPP, WMF-636 Pad 2, and AMWTP Outside Storage Area WAC for Existing and AMWTP Newly-Generated Waste," listed above.
- Off-site wastes shall not be received or stored in WMF-636 Pad 2, unless the waste has been supercompacted in WMF-676.
- Generators submit a waste profile. An example waste profile form is included in Appendix XXIII.
- Generators receive approval from AMWTP personnel prior to shipping waste to the MWMU(s).
- Waste is defined by a data package. The following information is required in a data package:
    - Hazardous waste manifest;
    - Container identification number;
    - Container assembly identification number (if applicable);
    - Waste generation site, date of packaging (closure date), weight, container type, shipment number, date of shipment, and vehicle type;
    - Process knowledge; and
    - Name of the certifying official.

C-1 Chemical and Physical Analyses [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR 264.13(a) and 270.14(b)(2)]

This section provides data on chemical and physical characteristics of waste received for storage and/or treatment at the MWMUs and data on waste presently stored at the TSA. The AMWTP waste characterization program extensively uses generator-supplied process information. Verification of generator-supplied data for existing waste stored at the TSA has been an ongoing activity since 1980. Activities previously conducted for waste verification include:

1. Visits to generator sites, completion of questionnaires, review of generator records, and generator personnel interviews to confirm potential hazards associated with the wastes;
2. Waste sampling and gas generation studies of waste to verify compliance with the WIPP WAC;
3. Detailed characterization using information obtained from waste shipment records, and observing waste-generating processes to verify for each IDC the waste form, the generation source of the waste, waste packaging and handling practices, waste container preparation, assay methods, and waste constituents;
4. Examination of more than approximately 119,000 containers via RTR; and
5. Return of more than 260 containers to the Rocky Flats Environmental Technology Site (RFETS), formerly the Rocky Flats Plant, to be reopened and visually examined for free liquids (presence and volume), sludges, particulate quantities, presence of pyrophoric, toxic, or corrosive materials, correspondence of contents with previous documentation, and physical description of the waste form.

The results from these studies are documented and serve as the basis for the HWNs assigned in RPT-TRUW-12 and in this document.

The majority of the waste presently stored at the TSA was generated off-Site at other DOE-operated facilities. Most of the waste has been received from the RFETS in Colorado.

Other sources of waste include the Mound Facility in Ohio, the Argonne National Laboratory-East (ANL-E) in Illinois, the Battelle Columbus Laboratory in Ohio, and the Bettis Atomic Power Laboratory in Pennsylvania, while a portion of the waste was generated at INL facilities.

Descriptions of containers used for storing waste at the TSA are provided in Section D-1a(1), Attachment 1.A. Except for some overpacking and repackaging of retrieved containers that are damaged and for containerizing contaminated soil/wood/plastic/tarps from retrieval operations, waste is primarily packaged by non-AMWTP generators. Additionally, fines and particulates resulting from waste handling may be collected in vacuums within the permitted units. Once full or otherwise deemed unusable, these vacuums are recombined with the parent waste streams for subsequent treatment or disposal. If filled vacuums require storage pending further treatment or disposition, they will be placed in appropriate containers, labeled, and managed accordingly.

The characterization strategy for the physical forms and chemical compositions of wastes received for treatment and storage at the MWMUs are further detailed in the following sections. Sections C-1a and C-1g focus on the characterization of the MW that enters each of the waste management areas. Section C-2 presents the specifics of the planned waste characterization activities. The chemical and physical analyses for newly-generated and off-Site waste are discussed in Section C-2e. Additional analyses pertaining to LDR for final waste forms are discussed in Section C-3, while additional requirements for waste shipped to the WIPP are discussed in Section C-4.

The sampling and analysis frequencies specified below and in Sections C-2, C-3, and C-4 are the frequencies that were implemented when operations of the MWMUs first began. These initial frequencies are statistically re-evaluated to determine whether the sampling frequencies need to be increased or decreased. The statistical method for determining the analytical frequency is included in the AMWTP Waste Characterization Quality Assurance Project Plan (QAPjP), as shown in Appendix XXIV.

C-1a Containerized Wastes [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR Part 264, Subpart I and 270.15(b)(1)]

The HWNs shown for each waste stream have been assigned based on a combination of process knowledge gathered from waste generators, waste-generator supplied data, and results of waste sampling and analysis. These data sources and the basis for assigning the HWNs are described in RPT-TRUW-12.

Containers are typically examined via RTR or by visual examination to verify contents and to identify SCW items, PCB-suspect electrical equipment, and other items that require separation prior to treatment. Items identified by examination as requiring removal from containers (e.g., non-vented gas cylinders, PCB-suspect electrical equipment, and liquids) are entered into the Operating Record. Characterization processes (e.g., RTR, assay) are briefly described in Section C-2b and in more detail in the AMWTP Waste Characterization QAPjP, as shown in Appendix XXIV. Containers identified as having free liquid may be treated in the MWMUs. The overall characterization strategies for waste are discussed below.

TSCA-regulated waste (regulated under 40 CFR 761) may be stored in the MWMUs. Seven of the IDCs listed in RPT-TRUW-12 are currently specified as possibly containing TSCA-regulated PCBs. They are Battelle 203 (paper, cloth, metals, and glass), RFETS 003 (organic setup), RFETS 302 (Benelex and Plexiglas), RFETS 480 (non-special source material), RFETS 743 (Pits 11 & 12 organic setups), RFETS 998 (Pits 11 &12 Cargos and Bins without Roaster Oxide), and RFETS 999 (Pits 11 & 12 Cargos and Bins with Roaster Oxide). Containers with PCB-suspect electrical items, such as fluorescent light ballasts and small capacitors, are expected to be present in certain waste streams. These containers may be sent to WMF-676 or another MWMU for sorting, treatment, and/or storage.

Characterization Strategy for Waste

The AMWTP waste characterization approach is summarized in Exhibits C-1 through C-3, using the following main principles:

- Prior to treating waste, RTR is used to examine 100% of the containers to identify the waste matrix and identify any liquids or other SCW items. If the specific IDC cannot be verified, the broader WG is verified and HWNs are assigned based on best

technical judgment. No additional sampling and analysis is required to complete the characterization of these waste containers. See Exhibit C-1 for further information.

Waste containers with known IDCs but unknown HWNs are subjected to sampling and analysis and to visual examination. HWNs may be assigned based on sampling and analysis (e.g., headspace gas) or a "representative" waste sample (when possible), or based on best technical judgment. See Exhibit C-2 for further information. This process is repeated until sufficient data are available to assign specific HWNs to this IDC.

- Containers for which IDCs or WGs cannot be assigned based on RTR are subjected to sampling and analysis and visual examination. For those rare instance where the correct IDC/WG cannot be determined following visual examination, HWNs are assigned based on a "representative" waste sample (when possible), or based on best technical judgment. See Exhibit C-3 for further information.
- AMWTP authorized RTR and/or visual examination personnel assign IDCs/WGs based on operational experience/expertise, characterization data and waste profile sheets for similar waste, generator waste-production history, sampling and analysis, etc. If an IDC cannot be assigned or if the IDC is listed with unknown HWNs, operators determine if a representative sample of the waste can be obtained. If so, analytical results are used to assign HWNs. Best technical judgment may be used to assign the broader WG to the waste and composited WG HWNs are assigned. These composited WG HWNs include all HWNs for the individual waste IDCs grouped within the WG, as applicable. A reduced, composited WG HWN list may be used when the process knowledge (e.g., physical matrix) supports the reduced list. All determinations involved in assigning IDCs, WGs, and/or HWNs are documented in the Operating Record. The information recorded in the Operating Record is updated within 72-hrs when new information is captured.
- When process knowledge is used for assigning HWNs and/or IDCs/WGs to an unknown container, it shall be used in conjunction with other characterization information (e.g., RTR, visual examination, assay, or sampling and analysis).

C-1g Wastes in Miscellaneous Units [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR Part 264.601 and 270.23(d)]

WMF-676 includes the following HWMA/RCRA-regulated miscellaneous treatment units:

- Box line and drum repack system areas that are used to sort, size reduce, repackage, sample, decant, neutralize, absorb, and visually inspect container contents;

- SCW glovebox system and DWPG which is used for decanting, neutralization, absorption, venting of gas containers, and opening/sampling smaller containers; and
- Supercompactor, used to compact waste drums into pucks and decant, neutralize, and absorb liquids.

The chemical and physical analyses associated with waste handled within WMF-676 are discussed in Section C-1a. Chemical and physical analyses specific to the miscellaneous units in WMF-676 are discussed below.

C-1g(1) Wastes in WMF-676 Pretreatment Areas

Containerized waste processed in the box lines and drum repack system pretreatment areas are typically not sampled and analyzed prior to receipt. This waste has been characterized, using process knowledge, visual examination, and/or RTR. For example, all containers of existing waste, and applicable containers of newly-generated waste, are examined via RTR to verify IDC, contents, and WG prior to receipt at WMF-676. In addition to preparing waste for downstream treatment, the pretreatment areas may be used to verify/obtain characterization data through visual examination. Verification of RTR characterization via visual examination is discussed further in the AMWTP Waste Characterization QAPjP, as shown in Appendix XXIV.

Both debris and non-debris waste may be processed through the WMF-676 pretreatment units, provided that the appropriate WAC are satisfied. Debris waste is intended for subsequent treatment via supercompaction, while the non-debris wastes are characterized, liquids treated, and transferred out of WMF-676.

WMF-676 Characterization Strategy for Debris Waste

RTR is the primary tool used for identifying SCW items and other items that do not meet the supercompactor WAC. Visual examination may also be performed on select debris drums to verify the accuracy of RTR results with respect to the identification of all prohibited/SCW items and debris WG. Since all boxes and bins require pretreatment/repackaging, it is not necessary to designate a percentage of these containers for additional visual examination.

Containers that require sorting and/or visual examination in the pretreatment areas are managed so that compatible waste is contained within any individual transfer container sent to

downstream treatment. This strategy simplifies the tracking of HWNs associated with the feeds to downstream treatment processes. To maximize the overall operational efficiency of WMF-676, IDCs from the same WG are intended to be co-mingled in containers. Debris waste with different IDCs/WGs is mixed only if the characterization information confirms that the wastes are compatible. When wastes from the same WG are combined, the sorted waste is then assigned HWNs based on technical judgment based on the information related to the IDCs/WGs involved. Waste with unknown IDCs/WGs and waste with known IDCs but unknown HWNs that are assigned composited HWNs based on best technical judgment, are not co-mingled with other wastes (i.e., waste from other WGs) until characterization is complete.

WMF-676 Characterization Strategy for Non-Debris Waste

The non-debris waste that is expected to be characterized in WMF-676 is primarily non-debris waste in smaller containers (typically 1-L to 5-gal capacity) found within larger containers. Non-debris waste for characterization is processed through the pretreatment areas and the SCW glovebox system. The primary objective of pretreatment for non-debris waste is to collect samples for analysis and treatment, as required. Non-debris waste which does not require additional characterization may also be processed in WMF-676. This waste is processed primarily to treat already characterized non-debris waste in the box lines for free liquids. This section is applicable only to non-debris waste requiring characterization.

There are two scenarios involving container-in-container for non-debris waste, which may require sampling. The first scenario is a drum of containers, which contain waste from the same process. When a drum that has multiple containers of the same non-debris waste that requires sampling, one container of the waste is randomly selected for sampling. The sample is collected and analyzed for total metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs).

The second scenario is a container of non-debris waste that is not representative of waste that is contained in other containers that are retrieved from primary containers. Unknown containers of non-debris waste are sampled in the SCW glovebox system or in the DWPG. The samples are subjected to total metal and organic (VOC and SVOC) analyses, as applicable. The analytical results from unknown non-debris waste are used to determine a sampling frequency

(see the AMWTP Waste Characterization QAPjP in Appendix XXIV). Unknown non-debris waste that is not sampled is assigned an SI, SO, SW, or soil WG based upon RTR, headspace gas analysis, and/or visual examination. This waste is then assigned the appropriate composited WG HWNs.

Liquids collected from containers with unknown HWNs or generated from AMTWP processes where the generated liquid is uncharacterized are tested for metals, organics, ignitability, and corrosivity prior to further management. Additional details on the sampling and characterization of the non-debris waste are presented in the AMWTP Waste Characterization QAPjP in Appendix XXIV and Section C-2.

C-1g(2) Wastes in the SCW Glovebox System and DWPG

SCW may be removed from containers in the pretreatment areas or the supercompactor, or may consist of entire IDCs that warrant unique handling in the SCW glovebox system and/or DWPG. Containerized liquids, elemental mercury, and items prohibited by the supercompactor WAC are expected to be the most common types of SCW removed from debris containers in the pretreatment areas. Liquids from the pretreatment areas and elemental mercury are generally collected in an appropriate container, as necessary, placed in a transfer container, and transferred either to the SCW glovebox system or the DWPG for treatment. Additionally, containers may be hand carried to the SCW glovebox system or the DWPG and enter via bagports. Sampling and analysis of SCW items is generally not conducted in the pretreatment areas, but is performed in the SCW glovebox system or DWPG. Therefore, until the chemical and physical analyses for these wastes are obtained, they are stored within the SCW glovebox system, DWPG, or the SCW collection area.

Liquids received at the SCW glovebox system and DWPG are examined for multiple phases, and separated, as required. Once separated, liquids are checked for pH using pH/litmus paper or a pH instrument and neutralized as required. After neutralization, liquids may be co-mingled based upon a positive compatibility test. Aqueous and organic liquids collected from waste containers with known HWNs are assigned the listed HWNs associated with the original waste.

Liquids collected from waste with unknown HWNs are subjected to pH/flashpoint measurement, total metals, and organic analysis. Following characterization of the liquid, it is neutralized (if found to be corrosive) and then absorbed on an appropriate material and transferred to downstream treatment or out of WMF-676.

Containerized elemental mercury from the pretreatment areas is not analyzed prior to absorption in the SCW glovebox system or the DWPG. However, if there is a second liquid phase with unknown HWNs, then the second liquid phase is decanted, analyzed, and treated as described above. See Attachment 1.H.ii for further information on the absorption of mercury in the SCW glovebox system or the DWPG. The smaller containers of SI/SO/SW SCW items that are opened are sampled (if necessary), repackaged, then transferred to a downstream treatment process or out of WMF-676. The SCW glovebox and the DWPG each have a maximum waste storage capacity of 200 gal. If additional storage capacity is required for SCW items pending analytical results, the sampled SCW items are removed from the SCW glovebox system or the DWPG and routed to the SCW collection area.

C-1g(3) Wastes in the Supercompactor Unit

Debris waste is intended for treatment via supercompaction, although some debris waste may be direct shipped to the WIPP or to another waste management unit. As discussed in Section C-1g(1), any sampling required to fully characterize debris waste is typically performed in the pretreatment areas, provided representative samples can be collected. As a result, the debris waste that arrives at the supercompactor for treatment is fully characterized. No additional characterization is required for this waste provided that the supercompactor WAC is satisfied.

Liquids in the supercompactor gloveboxes are treated as described in Attachment 1.H.iii.

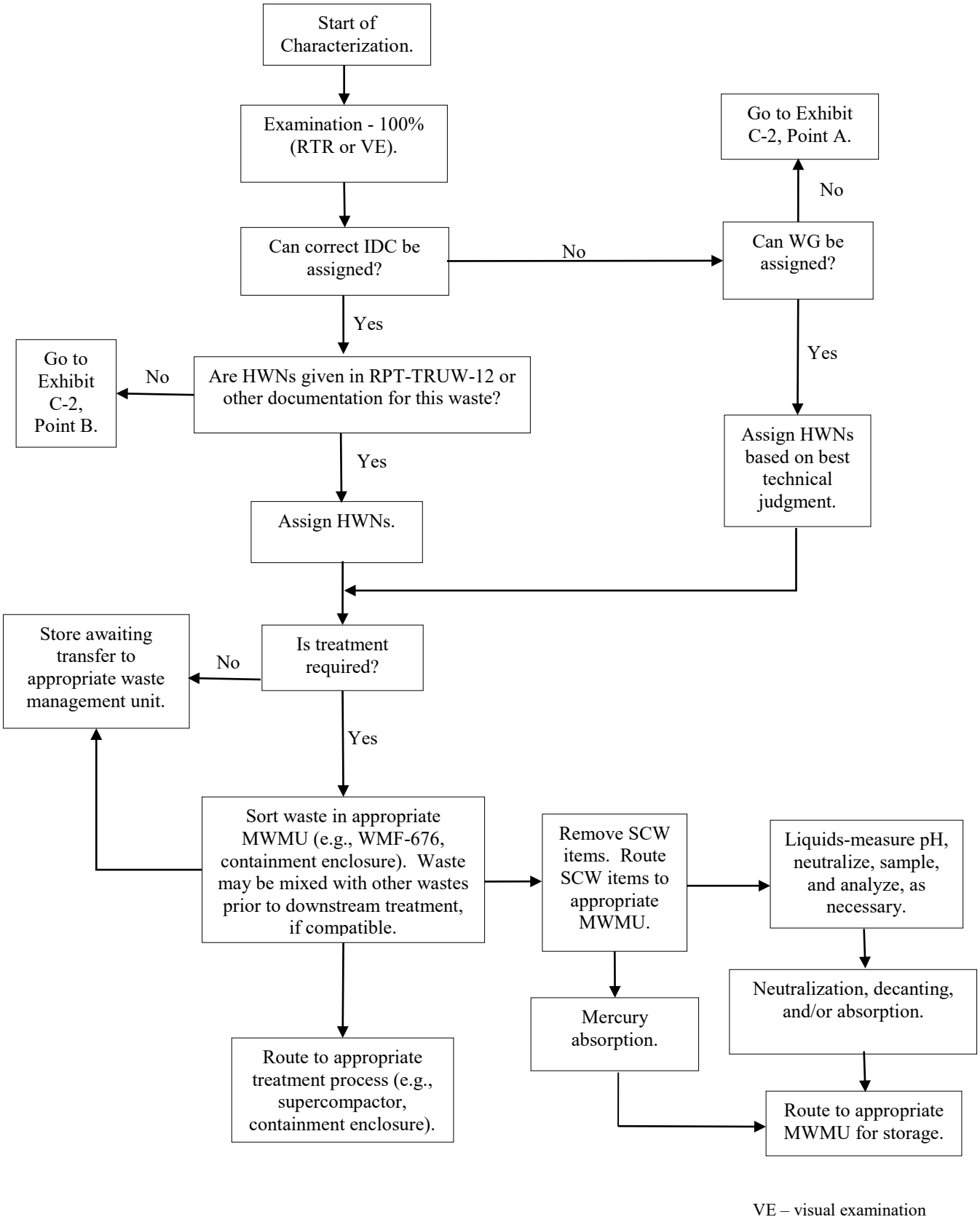
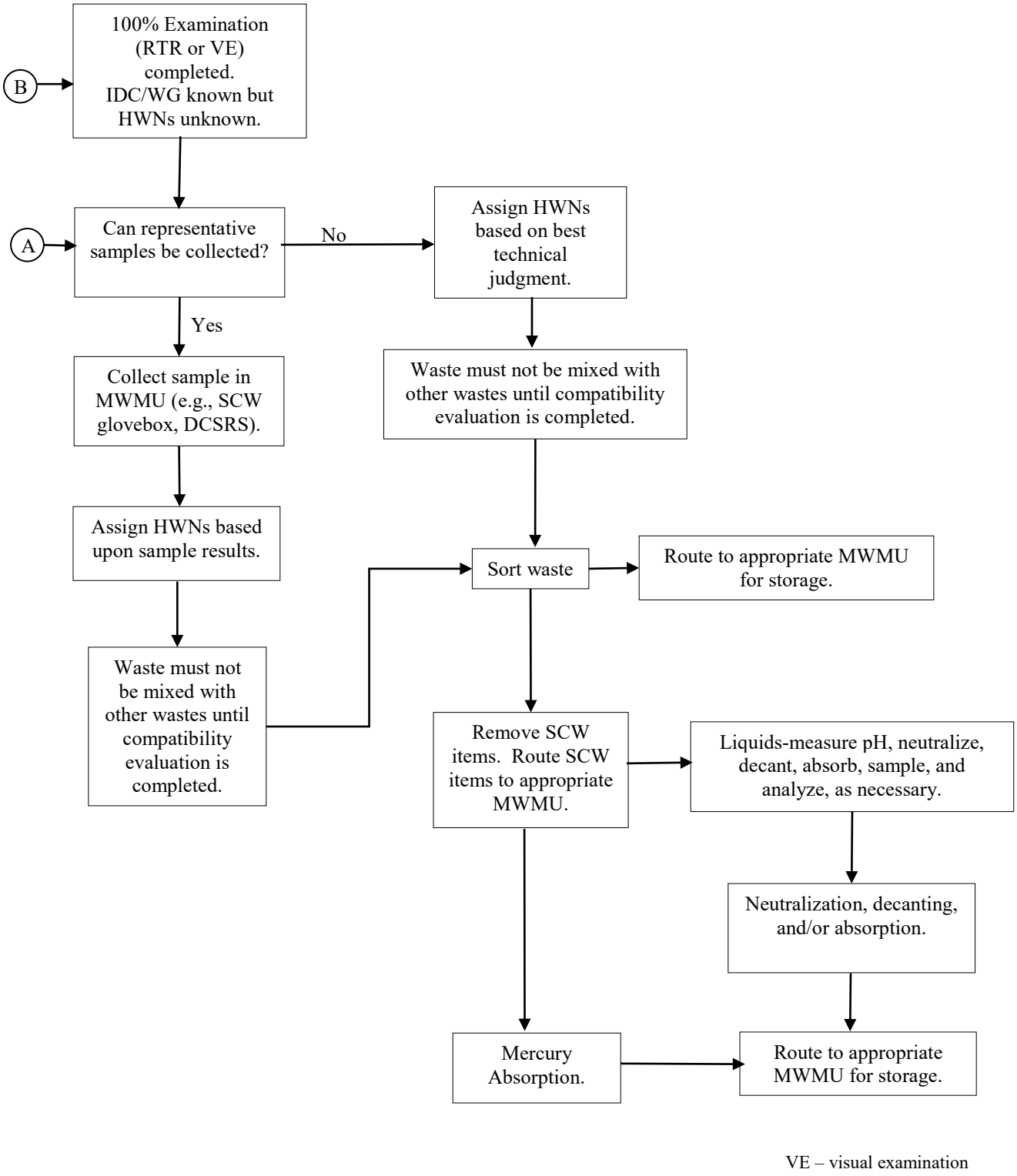
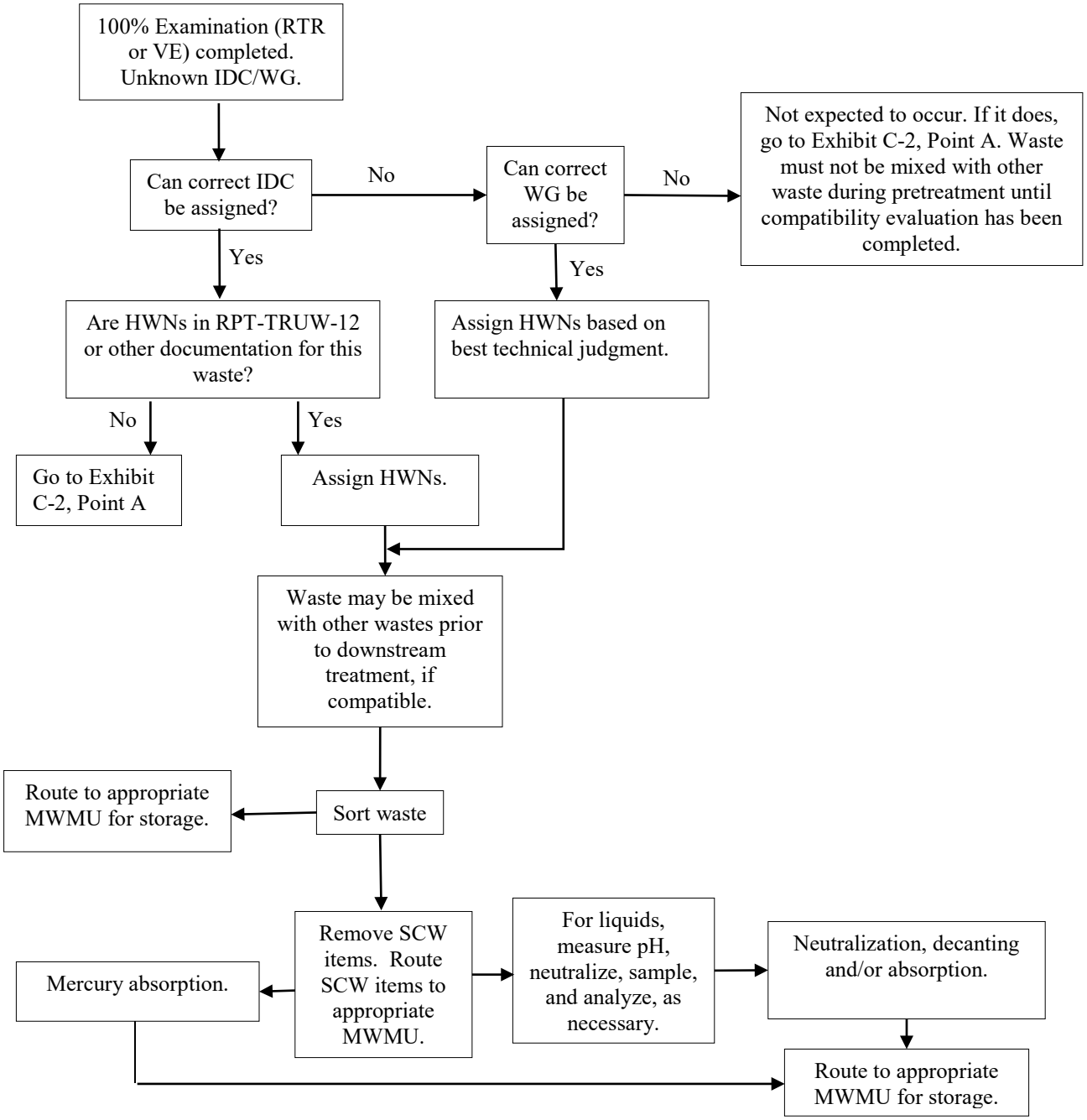


Exhibit C-1. Characterization of Waste with Known IDCs/HWNs



VE – visual examination

Exhibit C-2. Characterization of Waste with Known IDC/Unknown HWNs



VE – visual examination

Exhibit C-3. Characterization of Waste with Unknown IDCs/HWNs

C-2 Waste Analysis Plan [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR 264.13(b) and (c), and 270.14(b)(3)]

This WAP describes the methods for conducting characterization in the MWMUs. This WAP is designed to establish consistent characterization, sampling, sample management, analytical methods, parameter selection, and controls for waste at and generated by the AMWTP.

The objectives of this WAP are to:

- Ensure that sufficient information is available for safe and compliant handling, storage, treatment, and disposition of wastes and residues;
- Establish uniform and comparable waste characterization requirements;
- Verify that incoming wastes are properly characterized and described in required documentation;
- Generate information regarding the waste (from waste characterization, process knowledge, and waste profiles), in the Operating Record, for all wastes stored at the MWMUs;
- Ensure treatment residuals and AMWTP-generated wastes are characterized in accordance with regulatory requirements; and
- Ensure that waste is characterized to meet the disposal waste management unit's WAP.

C-2a Parameters and Rationale [IDAPA 58.01.05.008; 40 CFR 264.13(b)(1)]

Table C-1 summarizes the general parameters evaluated for waste, treatment residue, and secondary waste, and the rationale for their selection. The general parameters in Table C-1 are selected to ensure that adequate characterization is available to satisfy the requirements of HWMA/RCRA. Waste information is updated based upon waste characterization analysis performed as described in this section and in Section C-4.

The primary method used to characterize the waste accepted at the MWMUs is process knowledge, which serves as the basis for the HWNs assigned to existing IDCs. Additionally, waste is characterized by examination (RTR or visual examination) and/or sampling and analysis. See Exhibits C-1, C-2, and C-3 for a schematic presentation. All determinations involved in assigning IDCs, WGs, and/or HWNs are documented in the Operating Record,

typically via an electronic Data Management System (DMS). Analytical results obtained from the waste analysis are also entered into the Operating Record, typically via the DMS.

Prior to treatment, the waste containers are typically characterized using process knowledge. For liquid absorbent, the appropriate absorbent is selected based upon the process knowledge maintained within the waste profile and/or Operating Record.

In addition, any MW generated at the MWMUs from normal operations, leaks or spills, and/or closure processes are characterized by the methods described in this section. Leaks and spills are characterized utilizing process knowledge based upon the source of the leak or spill. The same HWNs that are assigned to the source of the leak or spill are assigned to the waste generated during the clean-up activities, as applicable. In the event that the source is unknown or the HWNs are not known for the source, sampling and analysis may be used.

C-2b Test Methods [IDAPA 58.01.05.008; 40 CFR 264.13(b)(2)]

Table C-2 summarizes the minimum characterization parameters, sampling methods, and frequencies for stored waste and secondary waste. Table C-3 summarizes the potential characterization/analytical methods that may be used to analyze waste, treatment residuals, and secondary waste. Analyses performed in accordance with the methods specified in SW-846, ASTM analytical methods, or other EPA-approved methods are typically performed at a contracted analytical laboratory.

Waste Characterization Equipment

The waste characterization equipment located within the MWMUs is used to examine containerized waste prior to treatment and/or disposition. The characterization equipment is also used to verify the accuracy of generator-furnished data packages. Most of the waste characterization systems are linked to the DMS. Data from characterization systems that are not connected to the DMS are generally electronically transmitted to the DMS. The Operating Record is used to collect information relative to containers examined at the MWMUs and to build databases to support decisions regarding eventual shipment, treatment, or disposal at appropriate waste management units.

AMWTP personnel have barcode readers to track the receipt and storage of waste containers. The AMWTP contains the following equipment in support of characterization:

- RTR equipment,
- Areas for performing visual examination (e.g., containment enclosures, gloveboxes),
- Drum assay equipment,
- Box assay equipment,
- Drum venting, and
- Headspace gas sampling and analysis capabilities.

RTR Characterization

RTR equipment (located in WMF-610, WMF-628 and WMF-634) includes a radiography system that normally consists of an x-ray producing device, an imaging system, an enclosure for radiation protection, a container handling system, an audio/video recording system, and a personnel control and data acquisition station. The RTR equipment utilizes controls in order to optimize data quality. The system allows AMWTP personnel to vary the voltage to provide an optimum degree of penetration through the container. The container is scanned while AMWTP personnel view the image on a monitor. An audio/video recording or equivalent is made, on non-alterable media, of the waste container RTR images. Typically, the RTR equipment is used to identify or confirm the waste description and packaging configuration, and to identify items prohibited at WMF-676 or another MWMU.

As described previously, RTR is used to identify liquids (including mercury), physical form of the waste, and the presence of prohibited items that require separation in WMF-676. Details on how RTR is used to verify physical form, prohibited items, and related quality control (QC) requirements are in the AMWTP Waste Characterization QAPjP, provided in Appendix XXIV. In the case of unlabeled containers, RTR is used to correlate the contents of the container with known waste types and, if possible, assign an IDC or WG. The RTR results are recorded in the Operating Record, typically via the DMS.

Visual Examination

Areas for performing visual examination (e.g., containment enclosures, gloveboxes) are located throughout the MWMUs. Visual examination constitutes opening a container to identify and/or verify waste container contents. Equipment used for performing visual examination varies upon the area where the examination is performed, but it may include items such as ventilation hoods, inspection stations, measuring devices, etc. Visual examination is normally performed as quality control check on RTR, but visual examination may also be performed in lieu of RTR in order to identify liquids, physical form of the waste, and the presence of prohibited items. Visual examination results are recorded in the Operating Record, typically via the DMS.

Assay Equipment

The drum assay systems are a combination of high-efficiency passive neutron, quantitative neutron, quantitative gamma ray, and active neutron techniques, which are used to determine radionuclide isotopic composition, quantify the radionuclide masses, and compute the associated derived quantities, such as total and TRU activity for each container.

The box assay system is a combination of high-efficiency passive neutron, quantitative gamma ray, and active neutron techniques used to determine fissile mass of a given container. Containers may also be radioassayed with portable equipment within the Type I Module, Type II Modules, SWEPP, and WMF-636 Pad 2. See Attachment 1.A for additional information.

Drum Venting and Headspace Gas Sampling

The DVS, located in WMF-634, is an on-line sampling system that contains multiple gas chromatography/mass spectrometry (GC/MS) units. Gas samples may also be collected from the drums and transferred to the GC/MS using canisters. Additional GC/MS equipment may be located in WMF-628, WMF-634, and WMF-635 via portable headspace gas sampling equipment.

Drums containing waste with known IDCs/WGs but unknown HWNs) are vented as a precaution against over-pressurization. A sample of the headspace gas from below the inner

liner of the drum is collected and generally injected into one of the GC/MS instruments, or other equivalent method. Headspace gas sample results on a container may be used to discriminate organic from inorganic waste or to provide additional characterization information. Additional information regarding the headspace gas sampling and analysis of unknown waste drums is provided in the AMWTP Waste Characterization QAPjP, presented in Appendix XXIV.

C-2c Sampling Methods [IDAPA 58.01.05.005 and 58.01.05.008; 40 CFR Part 261, Appendix I and 264.13(b)(3)]

As described earlier, waste generated from normal operations and/or closure processes (e.g., PPE, floor sweepings, rags/wipes from routine maintenance/decontamination activities, and equipment) is normally characterized based on the process knowledge of the original waste that comes into contact with the generated waste (see Table C-2). When this is not possible, the waste may be physically sampled (see Table C-4 for sampling equipment and strategies) and analyzed. Residuals, including debris from the routine decontamination/maintenance of treatment and/or storage areas, carry the HWNs assigned to the waste managed in the areas. Characteristic HWNs may be removed if it can be shown that the characteristic HWNs no longer apply.

The appropriate sampling technique for waste is based on knowledge of the waste matrix (e.g., solid, liquid, or sludge) and the specific analytes of interest. The sampling and analyses of liquids is conducted, as necessary, to address incompatibility concerns. Solid debris waste is generally contaminated with hazardous constituents at levels low enough that incompatibility concerns between solids (especially for solids within the same IDC or WG) are expected to be minimal. However, before mixing even solid materials from different containers, the IDC/WG characterization information is consulted to confirm that no incompatibilities exist.

Liquid waste, other than decontamination wastewater, is generated at the MWMUs primarily as SCW. Liquid waste may be retrieved as intact containers, free liquid removed from containers, or residual liquid removed from treatment areas. Liquid generated during treatment activities within the MWMUs retains the HWNs assigned to the original waste and is typically collected in an appropriate container for transfer to a MWMU where the liquid may be absorbed,

or the liquid may be absorbed in place. Characteristic HWNs may be removed if it can be shown that the characteristic HWNs no longer apply.

Non-debris wastes that are homogeneous in nature may be sampled through drum coring. The sampling and analysis of waste through drum coring is conducted to determine or verify HWNs. See Table C-4 for sampling equipment and strategies of non-debris waste.

The methods used for sampling waste in the MWMUs that are described in the AMWTP Waste Characterization QAPjP are those specified in SW-846, ASTM methods, or other EPA-approved methods. SW-846 procedures are used for sampling activities; specifically, sample size, container type, holding times, preservatives, replicates, and chain-of-custody. Personnel collecting samples are required to maintain a permanent log of sampling activities. The log entries include: purpose of sampling; date and time of collection; sample number; sampling location; sampling methodology; container description; waste description (sludge, liquid, contaminated soil, etc.); description of generating process or originating waste (IDC and container barcode number); name and address of waste generator; name and address of field contact; number and volume of samples; list of suspected hazardous constituents; field observations; field measurements; destination; and signature of collector, as applicable.

A chain-of-custody record is assigned to each sample or group of samples. The record contains the sample number, date and time of collection, sample description, and signatures of a collector and subsequent custodians. Additional quality assurance (QA)/QC procedures are described in the AMWTP Waste Characterization QAPjP. See Appendix XXIV for further information.

Contaminated disposable sampling equipment is managed in the same manner as the waste sampled. Reusable equipment is thoroughly decontaminated prior to reuse. Waste generated from decontamination activities is managed appropriately depending on either process knowledge, characterization, or the contaminant levels identified through the sampling and analysis.

C-2d Frequency of Analysis [IDAPA 58.01.05.008; 40 CFR 264.13(b)(4)]

The expected frequency of analysis is included in Table C-2. The frequencies listed are those established when operations began. However, these frequencies may be adjusted up or down, based upon operational experience and the consistency of analytical results, as required to maintain operational efficiencies. A statistical evaluation is conducted to evaluate whether the current analytical frequencies warrant adjustment. All statistical methods used are done to ensure that the characterization method being utilized correctly identifies the waste stream to allow the assignment of either a true mean or worse case concentration of the chemical constituents potentially present in each waste stream. Statistical methods utilized for the various AMWTP characterization techniques are documented in the Operating Record. For drum core sampling, a minimum of five drums per waste stream are sampled.

The statistical method for determining initial analytical frequencies for waste is based upon methods described in SW-846, Volume II, Chapter 9, and is presented in the AMWTP Waste Characterization QAPjP. New waste characterization data or more frequent analyses to ensure the initial data are accurate and representative of the waste stream over time are required when:

- A new waste stream is generated by AMWTP operations or received from off-Site;
- The process generating an established waste stream changes;
- Analytical data show that a waste stream that was expected to have a consistent composition is actually highly variable;
- The waste characteristics are highly variable from shipment to shipment for off-Site waste;
- Unexpected waste properties, items, or analytical results are encountered during pretreatment/treatment operations that are inconsistent with the current waste characterization information; or
- There is reason to suspect a change in off-Site waste based on inconsistencies in the manifest, packaging, appearance, or labeling of the waste; or there are inconsistencies between the waste verification results and the waste characterization data provided by the generator.

C-2e Additional Requirements for Waste Generated Off-Site [IDAPA 58.01.05.008; 40 CFR 264.12(b), and 264.13(c)]

Waste generated off-Site may be stored, treated, and/or characterized at the MWMUs. Off-Site waste must meet the requirements set forth in the WAC specified in this document to be accepted at the MWMUs.

The waste acceptance process at the MWMUs involves sequential execution of the following six steps:

1. Waste generators characterize their waste and transmit appropriate data to the AMWTP on a waste profile form. See Appendix XXIII for an example waste profile form.
2. The appropriate AMWTP personnel review the waste profile form and any other required/related documents and work with generators to resolve issues discovered during the review of the waste profile form.
3. AMWTP personnel conduct assessments of the generator facilities, as required.
4. When satisfied that the waste profile form is true, accurate, and complete, and that the waste meets the MWMU WAC, the appropriate AMWTP personnel authorize shipment of the waste.
5. The generator and AMWTP personnel finalize shipment logistics.
6. Waste movements are screened and inspected upon receipt before being accepted for management.

Off-Site generators are required to prepare and implement a Quality Assurance Program that has been assessed and approved by the appropriate AMWTP personnel. The Quality Assurance Program must describe the methods a waste generator uses to ensure waste is properly controlled and waste characterization, packaging, and documentation are accurate. The following basic elements must be addressed in the Quality Assurance Program, as a minimum, and the generator maintains the elements in an auditable form, unless explanations are provided detailing why a particular element is not relevant to the program:

- Contractor name and contacts;
- Descriptions of all processes generating wastes to be shipped to AMWTP;
- Facility waste management strategy;
- Organizational structure;
- Duties and responsibilities of key positions;
- Training and qualification of personnel, and qualification of procedures and equipment applicable to the waste being shipped;
- Waste separation/segregation and control;
- Waste characterization control, including process knowledge control of chemical constituent identification and quantification, and control of sampling and analysis in accordance with SW-846;
- Process knowledge information;
- Packaging, handling, and storage control; and
- Waste certification methodology.

Waste generators with an AMWTP approved Quality Assurance Program are required to submit a complete waste profile that must be approved by AMWTP personnel before shipment or acceptance of the waste. The waste characterization information provided in the waste profile form may be based on process knowledge, original material safety data sheets (MSDSs), and/or a detailed chemical and physical analysis of a representative sample. The basic minimum information required is outlined below:

- General Information: Information including the location generating the waste, technical contacts, rate of generation, name of waste, and a description of the process generating the waste. It includes a description of any documentation attached, including analytical data, process knowledge documentation, and MSDSs.
- Physical Characteristics of Waste: Information including waste types or description, physical state, solid or liquid, layers, pH, density, flash point, and chemical composition and constituents is listed, as applicable. This information can be based upon process knowledge.
- Chemical Characteristics of Waste: Information including process knowledge or analytical data for total metals, volatiles, semivolatiles, pesticides and herbicides, HWMA/RCRA listed wastes (F, K, U, or P), and whether the waste can be classified as a wastewater. This information can be based upon process knowledge.

- Radiological Characteristics of Waste: Requires the generator to determine the radioisotope composition of the waste. This information may be based upon process knowledge.
- Certification: The generator, or authorized designee, must sign a certification statement to certify that all information provided in the waste profile is true, accurate, and complete.

Process knowledge and/or analytical data must be provided to accurately identify all applicable HWNs and underlying hazardous constituents (UHCs), if applicable; TSCA-regulated wastes; DOT hazard classes; and the proper shipping names. If adequate process knowledge exists to ensure that a particular constituent is not present in the waste and this information is documented, then there is no requirement to analyze for that constituent. For example, if there is no reason to suspect pesticides and herbicides, analysis for those parameters is not required. However, the waste profile must establish that there is no reason to suspect the constituent is in the waste. This can be accomplished by including a detailed process description and/or published data of the process with the waste profile. Laboratory analysis, if required for waste profiling, is performed and documented by a laboratory with QA/QC procedures in compliance with SW-846.

The technical accuracy review includes evaluation of the waste profile for conformance to the MWMUs WAC. If the waste profile, waste packaging data, and supporting data are found to be in proper order; if the waste meets the WAC and WAP; and if the waste is within the Part A Permit Application limits, the waste is approved and the generator is notified. As part of this approval notification, the AMWTP notifies the off-Site generator in writing that the AMWTP has the appropriate permits for managing the generator's waste and accepts the waste the generator is shipping per IDAPA 58.01.05.008 (40 CFR 264.12) requirements. If information in the waste profile deviates from these conditions, the deviations are resolved before the shipment is authorized.

If verification is performed at the generator location, AMWTP personnel place tamper-indicating devices on the shipment containers to ensure that tampering of the container has not occurred after verification. Otherwise, waste from off-Site generators destined for storage at the MWMUs undergoes waste verification. Upon arrival, 10% of the containers in

each shipment of waste from off-Site generators are randomly selected to undergo fingerprinting by one or more of the following:

- Use of RTR equipment or performing visual examination to verify waste form contents and AMWTP prohibited items, and/or
- Headspace gas sampling and analysis for target VOCs.

The shipment is not officially accepted until waste fingerprinting/verification results are received that substantiate the data on the generator's waste profile sheet. This 10% verification frequency is adequate to determine whether the shipment is rejected or accepted. Noncompliances with the MWMUs WAC, fingerprinting results, or other discrepancies are formally resolved with the generator. Resolution may be verbal or written. The DEQ is verbally notified in a timely manner of all nonconformances related to off-Site shipments. Written notification of the resolution is provided to the DEQ within 15 days of resolving the nonconformance. In accordance with IDAPA 58.01.05.008 (40 CFR 264.72), the notification describes the discrepancy and attempts to reconcile it. Copies of the manifest and other shipping papers are included.

When off-Site waste shipments arrive, the following steps are implemented:

- Security inspectors or other appropriate personnel notify AMWTP personnel that the waste shipment has arrived.
- AMWTP personnel review the shipping papers for completeness and accuracy.
- AMWTP personnel perform radiological control and industrial safety inspections of the shipment and its contents in accordance with established procedures for receipt, inspection, and documentation of waste received.
- Following completion and documentation of the receiving inspections, the waste shipment is tentatively accepted.
- For off-Site waste, final inspection of incoming shipments is completed and the results are recorded in the Operating Record. After verification has been approved, the waste shipment is officially accepted for receipt, the containers are unloaded, and the containers are then placed in storage.

The ultimate responsibility for MW characterization resides with the generator. Any HWMA/RCRA-regulated waste shipped to the MWMUs that does not conform to the WAP and WAC requirements may be returned to the waste generator for resolution or may be corrected

prior to acceptance. AMWTP personnel have the responsibility and authority to evaluate the WAP and WAC violations and to determine the corrective action required of the generator. Attempts are made to resolve discrepancies in shipping manifests. If the discrepancy cannot be resolved, the shipment is returned to the generator unless the discrepancy involves the condition of the package. Damaged containers are repaired, repackaged, or overpacked, to prevent the release of waste constituents during transport.

C-2f Additional Requirements for Ignitable, Reactive, or Incompatible Wastes [IDAPA 58.01.05.008; 40 CFR 264.13(b)(6) and 264.17]

Generators of off-Site waste are required to provide information that identifies any potential ignitable, reactive, or incompatible wastes prior to their acceptance. The generator-supplied information is reviewed to determine if the waste is reactive, explosive, or flammable/hazardous compressed gas.

No waste in the existing TSA inventory is assigned HWN D003 by RPT-TRUW-12. Historically, IDCs RFETS-480 and -481 were the only wastes for which small amounts of pyrophoric, unoxidized plutonium were identified as potential problems. Further examination of the documented process knowledge (from Report No. WM-F1-82-021, "Content Code Assessments for INEL Contact-Handled Stored Transuranic Wastes") revealed that this was a concern only for RFETS-481. However, the referenced report states that any pyrophoric plutonium fines present in the waste were washed off the metal debris prior to packaging. Any IDCs that are determined to contain pyrophoric radionuclides are addressed under the Atomic Energy Act (AEA), and procedures for their management are implemented. However, any such wastes are not designated as HWN D003 reactive wastes, since the pyrophoric/reactive characteristic is associated strictly with the AEA regulated portion of the waste.

Further examination of documented process knowledge (from Report No. ICP/EXT-04-00248, "Historical Background Report for Rocky Flats Plant Waste Shipped to the INEEL and Buried in the SDA from 1954 to 1971") and historical shipping records from Rocky Flats to the INL have revealed that depleted uranium waste may be present at the AMWTP. The depleted uranium waste (e.g., machining chips, turnings, and fines) was originally incinerated (i.e., roasted) at Rocky Flats Building 447 in order to convert the depleted uranium to a stable

oxide form prior to shipment to the INL. Based upon current evidence, the practice of roasting depleted uranium at the Rocky Flats Facility did not ensure that all of the depleted uranium was completely oxidized. Therefore, there may still be pyrophoric depleted uranium present within IDC 751 (roaster oxides). As stated previously, these wastes are not designated as HWN D003 reactive wastes, since the pyrophoric/reactive characteristic is associated strictly with the AEA regulated portion of the waste. Any IDC 751 roaster oxide containers will be stored, inspected, and managed as stated in Attachments 1.A, 4, and 6.

Only a few of the IDCs in RPT-TRUW-12 are assigned HWN D001. Most of these ignitable IDCs are so designated because of the presence of nitrate salts, which are oxidizers. The remaining IDCs are assigned HWN D001 because of the potential presence of cyclohexane, and are only a concern if liquids are detected. The existing ignitability determinations given in RPT-TRUW-12 are verified and documented in the detailed IDC-specific waste profiles that are maintained for all wastes managed at the MWMUs.

AMWTP personnel ensure that incompatible wastes are segregated during storage. The MWMUs WAC prohibits the receipt of waste with reactives, pesticides/herbicides, unstable chemicals, and incompatible wastes. These prohibitions and limitations have been enacted to ensure safe waste management practices by minimizing the potential for accidental commingling of incompatibles.

A waste compatibility evaluation was performed for the AMWTP using the EPA guidance manual "A Method for Determining the Compatibility of Hazardous Wastes," EPA-600/2-80-076, April 1980. The methodology involves classifying IDCs into 41 reactivity group numbers (RGNs) and then, using a chemical compatibility chart, determining the compatibility of each potential binary combination of reactivity groups. The compatibility evaluation covered the waste IDCs identified in RPT-TRUW-12, and the results are presented in "Chemical Compatibility Evaluation of Transuranic Waste for the AMWTP," AMWTP-5232-RPT-ESH-014, (RPT-ESH-014). RPT-ESH-014 is maintained in the Operating Record and updated as new characterization information becomes available, as required. This evaluation determines the incompatibilities for the storage and treatment (e.g., commingling) of the waste IDCs identified in RPT-TRUW-12.

The commingling of any waste will only occur after the waste streams to be commingled have been evaluated for compatibility. Should the process information on the compatibility of waste be insufficient to determine if liquid waste streams are compatible, a compatibility test will be run using ASTM D5058-90 Test Method A, prior to commingling the liquid waste.

Extensive waste data have been developed for each IDC documenting the existing characterization information and the results of the compatibility evaluations. As the waste characterization efforts progress, the compatibility evaluations are updated and the wastes are re-categorized into the 41 RGNs to identify any new incompatible binary combinations. If additional incompatibilities are identified or data validation/waste characterization eliminates potential incompatibilities, additional precautions may be implemented or certain practices may be relaxed, as warranted.

Table C-1. Summary of General Parameters for Wastes and the Rationale for Selection

Waste Parameter(s)	Media Type	Rationale for Selection
IDC/WG	Debris and non-debris	Determine if HWNs can be assigned based on RPT-TRUW-12.
HWNs and hazardous constituents	Debris and non-debris	Verify HWNs are included in the Part A Permit Application.
Physical matrix via examination (RTR or visual examination)	Debris and non-debris	Verify matrix and debris WG, assign IDC/WG/HWNs to unknown debris drums, identify items that require removal.
Headspace gas	Debris and non-debris	Aid in identifying IDC for drums of unknown non-debris and debris wastes.
Reactivity, ignitability, and compatibility evaluations	Debris and non-debris	Identify potential reactivity and health and safety precautions prior to sorting.
pH	Liquid	Identify liquids requiring neutralization and appropriate precautions for corrosive waste.
Flash point	Liquid	Identify appropriate precautions for ignitable waste.

Table C-2. Minimum Characterization Parameters for Wastes

Waste Stream	Sampling Method	Sampling Frequency	Analytes and Analytical Methods
Primary Wastes			
Boxes and drums	Non-intrusive	100%	Examination (RTR or VE) to verify physical matrix, verify IDC and debris or non-debris WG, identify items for removal
	Non-intrusive	100% of all IDCs with known HWNs and hazardous constituents	Completion of process knowledge-based ignitability, reactivity, and compatibility evaluations
	Intrusive	Based on miscertification rate per the AMWTP Waste Characterization QAPjP	Visual examination to verify RTR results. Removal of any SCW items.
SCW items	Grab with Coliwasa, tube sampler, or equivalent	100% if liquid is unknown	PK for known/listed characteristic HWNs pH, flashpoint Toxic metals Organics
	Grab with scoop (for small inner containers)	100% of unknown non-debris drums initially with statistical revaluation for individual containers; 1 container per selected drum for container-in-container waste from a single IDC	PK for known/listed characteristic HWNs Corrosivity/pH Toxic metals Reactivity and compatibility evaluations based on PK and/or analytical results Containerized free liquid via visual examination or RTR Organics
Secondary Wastes:			
Used PPE, rags, decon debris, etc.	NA	NA	PK – cleanup debris characterization and treatment identical to waste being handled; PCB-contaminated rags are managed per TSCA regulations
Maintenance metal debris	NA	NA	PK – characterization identical to waste being handled
Used HEPA filters in drums	NA	NA	PK – characterization identical to waste being handled
Broken-down wooden process boxes	NA	NA	PK – disposed as LLW unless PK indicates otherwise
Crushed process drums	NA	NA	PK – disposed as LLW unless PK indicates otherwise
Absorbed hydraulic oil	NA	NA	PK – characterization prior to direct ship, identical to waste being handled
Sample Residues	NA	NA	PK—characterization identical to waste being handled
Contracted analytical lab absorbed liquid residues	NA	NA	PK—characterization prior to direct ship, identical to waste being handled

Table C-2. Minimum Characterization Parameters for Wastes (continued)

Waste Stream	Sampling Method	Sampling Frequency	Analytes and Analytical Methods
Absorbed supercompactor liquid	NA	NA	PK – characterization prior to absorption, this is included with the SCW items listed in this table
Absorbed decon water	NA	NA	PK – characterization prior to direct ship, identical to waste being handled
Sweepings from box breakdown area	NA	NA	PK – characterization prior to supercompaction, identical to waste being handled
SCW core sample residue	NA	NA	PK – characterization prior to direct ship, identical to waste being handled
Analytical lab absorbed liquid residues	NA	NA	PK – characterization prior to direct ship, identical to waste being handled

VE = Visual examination

PK = process knowledge

NA = not applicable

Table C-3. Potential Waste Characterization Methods

Parameters	Analyte	Characterization/Analytical Method
IDC/WG	NA	PK, RTR, visual examination
HWNs	NA	PK, RTR, visual examination, drum coring, and/or sampling and analysis
HWMA/RCRA listed wastes, waste constituents, composition	Volatile Organics	PK, SW-846
	Semi-volatile organics	PK, SW-846
	Metals	PK, SW-846
Toxicity characteristic constituents (TCLP may be used for final waste form LDR status determinations)	TCLP metals (Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver)	PK, SW-846
	TCLP organics	PK, SW-846
Other parameters	Free liquids	PK, RTR, visual examination
	Cyanide, total & amenable	PK, SW-846
	Thallium	PK, SW-846
	Antimony	PK, SW-846
	Beryllium	PK, SW-846
	Nickel	PK, SW-846
	Vanadium	PK, SW-846
	Zinc	PK, SW-846
Debris/non-debris status, SCW identification	Physical matrix	PK, RTR, visual examination
Reactivity/cyanide or sulfide-bearing	Reactivity/cyanide or sulfide-bearing	PK; Methods for Chemical Analysis for Water and Waste, EPA-600/4-79-020
Compatibility[a]	Compatibility	PK, waste characterization results, compatibility evaluations, ASTM, SW-846
Ignitability	Ignitability	PK, ASTM, SW-846
Corrosivity/pH	Corrosivity/pH	PK, SW-846

a. Compatibility determinations are made by a combination of process knowledge; analysis; compatibility evaluations per "A Method for Determining the Compatibility of Hazardous Wastes" (EPA-600/2-80-076), compatibility groupings in 40 CFR 264, Appendix V; compatibility by hazard class in accordance with DOT, and/or waste-to-waste compatibility testing.

Table C-4. Methods and Strategies for Sampling Debris/Secondary Waste

Waste Composition	Sampling Equipment	Sampling Strategies
HEPA filters, composite filters	Shredder, scissors, shears, scoop, spoon Rotating coring device	Shredding, cutting, or size-reducing an appropriately-sized sample Size-reduced composite sample, where applicable
Plastic bags, PPE	Shredder, scissors, shears, scoop, spoon	Shredding, cutting, or size-reducing an appropriately-sized sample (size-reduced composite sample, where applicable)
Filter media and HEPA filters	Shredder, scissors, shears, scoop, spoon Rotating coring device	Shredding, cutting, or size-reducing an appropriately-sized sample Size-reduced composite sample, where applicable
Paper, cloth	Shredder, scissors, shears, scoop, spoon	Shredding, cutting, or size-reducing an appropriately-sized sample (size-reduced composite sample, where applicable)
Drums, cans, furniture, motors/pumps, construction hardware (nails, screws, etc.)	Drill, rotating coring device, surface swipes	Size-reduced composite sample, grab sample, or swipe analysis
Asphalt, uncoated concrete, firebrick, cinder block	Impact hammer (hammer and chisel), rotating coring device	Size-reduced composite sample
Uncoated wood	Rotating coring device, shredder, or other appropriate equipment	Size-reduced composite sample
Coated concrete, coated wood	Rotating coring device, shredder, or other appropriate equipment	Size-reduced composite sample
Glass, plastic	Shredder, scissors, shears, impact hammer for fracturing, etc.	Size-reduced composite sample
Rubber	Shredder, scissors, shears, scoop, spoon	Shredding, cutting, or size-reducing an appropriately-sized sample (size-reduced composite sample, where applicable)
Metal tools, structural steel, steel pipe, rebar, assorted scrap	Drill, rotating coring device, surface swipes	Size-reduced composite sample, grab sample, or swipe analysis
Contaminated metal equipment (machinery, glove boxes)	Drill, rotating coring device, surface swipes	Size-reduced composite sample, grab sample, or swipe analysis

C-3 Waste Analysis Requirements Pertaining to Land Disposal Restrictions [IDAPA 58.01.05.008 and 58.01.05.011; 40 CFR 264.13 and 268.7]

The Hazardous and Solid Waste Amendments (HSWA) prohibit the land disposal of certain types of hazardous wastes. The U. S. Congress has granted the WIPP a "No Migration Variance," thus waste destined for shipment to the WIPP is not subject to LDR requirements. Therefore, waste destined for the WIPP is not subject to the requirements of this section.

Waste managed at the MWMUs that is destined for disposal at waste management units other than the WIPP is assumed to be restricted waste subject to LDR requirements. Information presented in this section describes how generators and the AMWTP characterize, document, and certify LDR subject wastes.

Off-Site generators sending wastes to the MWMUs are required to provide all notifications and certifications as mandated by IDAPA 58.01.05.011 (40 CFR 268.7). Accordingly, generators of wastes that are subject to the LDRs or any LDR-related variances are required to submit to AMWTP personnel the notifications and certifications required by LDR with their shipments.

In cases where a generator determines that an LDR waste does not meet the applicable treatment standards set forth in IDAPA 58.01.05.011 (40 CFR Part 268, Subpart D), or exceeds the applicable prohibition levels set forth in IDAPA 58.01.05.011 (40 CFR Part 268, Subpart C), the generator provides a one-time written notice with the initial shipment. The following information is included with the initial waste shipment:

- HWNs and shipping information;
- Notification that the waste is subject to LDRs and listing the constituents of concern for HWNs F001-F005, F039, and UHCs, unless the waste is treated and monitored for all constituents. If all constituents are treated and monitored, there is no requirement to list those constituents on the LDR notice;
- The notice must include the applicable wastewater/non-wastewater category {see IDAPA 58.01.05.011 [40 CFR 268.2(d) and (f)]} and subdivisions made within a HWN based on waste-specific criteria (such as HWN D003 reactive cyanide); and
- Waste analysis data when available.

Copies of all LDR-required notices (received or sent by the AMWTP) are retained as part of the Operating Record per IDAPA 58.01.05.008 (40 CFR 264.73).

C-3a Waste Characterization [IDAPA 58.01.05.008 and 58.01.05.011; 40 CFR 264.13 and 268.7]

For non-AMWTP newly-generated and off-Site wastes, the waste generators are required to document the level of characteristic and listed hazardous constituents in wastes shipped to the MWMUs. This information, coupled with the other analytical requirements stipulated in the WAC and WAP, allows generators and AMWTP personnel to accurately make LDR determinations. For wastes in the existing waste inventory and wastes generated by the MWMUs, existing process knowledge/waste characterization information supplemented by waste verification and analysis information are used to make LDR determinations. The supporting data used to make LDR determinations are maintained in the Operating Record, as described earlier.

C-3b Sampling and Analytical Procedures [IDAPA 58.01.05.008 and 58.01.05.011; 40 CFR 264.13(b)(2) and (3), and 268.7]

LDR waste forms generated by the AMWTP are sampled and analyzed (Tables C-3 and C-4) using only EPA-approved methods, as stated in Sections C-2b and C-2c. Approved test methods are discussed in the AMWTP Waste Characterization QAPjP, presented in Appendix XXIV.

C-3c Frequency of Analysis [IDAPA 58.01.05.008 and 58.01.05.011; 40 CFR 264.13(b)(4) and 268.7]

LDR wastes are characterized at frequencies specified in, or designed to meet, the selected waste management unit's WAP. In accordance with IDAPA 58.01.05.008 (40 CFR 264.13), wastes treated at the AMWTP are subjected to a full characterization whenever:

- A new waste stream is generated or received,
- A generating process changes,
- Waste characteristics exhibit temporal variations, or

- Waste from off-Site generators does not match the waste designated on the accompanying manifest or the waste fails waste verification.

Analytical frequencies for LDR purposes are re-evaluated statistically using the statistical formulas given in the AMWTP Waste Characterization QAPjP, presented in Appendix XXIV.

C-3d Additional Requirements for Treatment Facilities [IDAPA 58.01.05.008 and 58.01.05.011; 40 CFR 264.13 and 268.7]

This section describes the additional sampling, analytical, and documentation requirements the AMWTP employs when treating LDR waste at the MWMUs.

In addition to the required information for LDR notifications, any other information required in applicable IDAPA 58.01.05.011 (40 CFR 268.7) notifications must be included. LDR certifications are completed by AMWTP personnel when MW meets LDR treatment standards after treatment, in accordance with IDAPA 58.01.05.011 [40 CFR 268.7(b)] requirements.

C-3d(1) Off-Site Facilities [IDAPA 58.01.05.008 and 58.01.05.011; 40 CFR 264.13(a) and 268.7(b)]

All off-Site waste received by the AMWTP is received per Section C-2e. See Section C-2e for additional information.

C-3d(2) Analysis of Waste or Waste Treatment Residues [IDAPA 58.01.05.008 and 58.01.05.011; 40 CFR 264.13 and 268.7]

Final waste forms are assigned the HWNs assigned to the original waste treated. Characteristic HWNs may be removed if it can be shown that the characteristic HWNs no longer apply.

For wastes not treated to meet an alternative debris treatment standard (IDAPA 58.01.05.011; 40 CFR 268.45), the UHCs expected to be in the original waste are also determined, if the original waste was designated with HWNs D001, D002, D004-D011, or D018-D043. Sampling and analyses of the final waste forms (in accordance with SW-846 methods) determine if the applicable treatment standards and universal treatment standards (UTS) have been satisfied. The inorganic UHCs listed in IDAPA 58.01.05.011 (40 CFR 268.48)

are typically measured via TCLP extraction followed by the appropriate analytical methods (except for fluoride, vanadium, and zinc). However, total and amenable cyanide analyses are included only for waste feeds carrying HWNs F006-F009, and are not performed on TCLP extracts. Compliance with the UTS for selected organic UHCs (i.e., those reasonably expected to be in the waste at the initial point of waste generation) is also verified by analyses. The organic UHCs are included in final waste form analyses only until data are available to justify their elimination. The initial checks for compliance with organic UTSs are required to demonstrate that a "good-faith analytical effort" was attempted to achieve analytical detection limits for the organic UHCs that do not exceed the specified UTSs by an order of magnitude.

Secondary wastes generated from normal operations that undergo further treatment at the MWMUs are tested and/or process knowledge is used to determine if the waste mandates any additional LDR treatment standards. The MW generated is assumed to be restricted waste. Final determinations on whether the waste is restricted occur upon receipt of analytical results and/or upon completing process knowledge evaluations.

When sampling and analysis is used to determine if a MW meets LDR treatment standards, total analysis is used for cyanide and organics while metals are determined via totals (wastewater) or TCLP extraction (nonwastewater), and the appropriate analytical method, as specified in IDAPA 58.01.05.011 (40 CFR 268.40 and 268.48). Liquid/non-liquid determinations of waste generated are based on process knowledge, visual assessments, and/or testing using the paint filter liquids test.

Debris waste treated to meet an alternative debris treatment standard is assessed for LDR compliance by evaluating the final waste form against the performance standards specified in IDAPA 58.01.05.011 (40 CFR 268.45).

C-3d(3) Sampling and Analytical Procedures [IDAPA 58.01.05.008 and 58.01.05.011; 40 CFR-264.13 and 268.7]

The sampling and analytical procedures used to characterize secondary wastes for LDR compliance verification are described in the AMWTP Waste Characterization QAPjP, located in Appendix XXIV, and are designed to meet the expected receiving waste management unit's WAC and WAP.

C-3d(4) Frequency of Analysis [IDAPA 58.01.05.008 and 58.01.05.011; 40 CFR 264.13 and 268.7]

The frequency of analyses for final waste forms and secondary wastes is specified in Table C-5, unless changes are warranted based on trends shown in actual analyses. Analytical frequencies for LDR purposes are evaluated statistically per the AMWTP Waste Characterization QAPjP, or in accordance with the receiving waste management unit's WAP.

Table C-5. LDR Sampling and Analysis of Final Waste Forms

Waste Form	Sampling Method	Sampling Frequency	Analytes and Analytical Methods[a]
Final waste forms	Trier, thief, chisel, scoop, auger, impact hammer, rotating coring device to collect composite/grab sample	10% of containers initially with statistical re-evaluation	Toxic metals/inorganic UHCs: Antimony Arsenic Barium Beryllium Cadmium Chromium (total) Cyanide (total and amenable) Lead Mercury Nickel Selenium Silver Thallium Volatile and semi-volatile organic regulated hazardous constituents and UHCs

a. Analytical methods are performed in accordance with SW-846 or other EPA-approved methods.

C-4 Waste Analysis Requirements Pertaining to the WIPP [IDAPA 58.01.05.008; 40 CFR 264.13]

The WIPP is a designated disposal facility for TRU waste and is a fully permitted disposal facility for MW. As mentioned in Section C-3, the WIPP is not subject to LDR. All MW disposed at the WIPP is subject to the WIPP Hazardous Waste Permit, as amended, by the New Mexico Environment Department. The information included in this section is a portion of the characterization requirements for disposal at the WIPP, and relates primarily to those activities that are used to update the process knowledge information for the various waste streams destined for disposal at the WIPP.

C-4a Waste Characterization [IDAPA 58.01.05.008; 40 CFR 264.13]

Prior to transfer to and receipt by the WIPP, waste must be characterized according to the WIPP WAP, Attachment B of the WIPP RCRA Hazardous Waste Permit. AMWTP waste destined for WIPP disposal must meet the requirements of the WIPP WAP, as amended. The descriptions of the activities associated with WIPP WAP characterization activities are current as of the submittal date for this revision, and will be adjusted to meet the WIPP WAP amendments, as necessary.

The WIPP allows for waste that consists of particles smaller than 2.36 in. in size to be considered debris if the waste is a manufactured object and if it is not a particle of soil or process residues (i.e., inorganic process residues, inorganic sludges, salt waste, and pyrochemical salt waste). Containers of this waste that can be shipped to the WIPP are characterized using acceptable process knowledge, RTR, visual examination, and/or sampling and analysis. Randomly selected containers of non-debris waste are selected for representative sampling and analyses according to Section C-4b.

C-4b Sampling and Analytical Procedures [IDAPA 58.01.05.008; 40 CFR 264.13(b)(2) and (3)]

Selected drums of non-debris waste that can be direct shipped to the WIPP are sampled within the DCSRS in WMF-634. The drums to be sampled are randomly selected from the waste stream. There are four non-debris waste streams: SI, SO, SW, and soil.

The DCSRS is used to extract a core from the waste in the drum at a randomly selected location. After the core has been extracted, a sample is collected from a random location over the length of the core. This sample, therefore, is extracted from a random location in both the horizontal and vertical planes. The selection of the sample is documented in the Operating Record. Further information is provided in the AMWTP Waste Characterization QAPjP.

The methods used for sampling MW that are described in the AMWTP Waste Characterization QAPjP are those specified in ASTM methods or other EPA-approved methods. SW-846 QA/QC procedures are used for sampling activities; specifically, sample size, container type, holding times, preservatives, replicates, and chain-of-custody. AMWTP personnel performing sample collection are required to maintain a permanent log of sampling activities. The log entries include the following:

- Purpose of sampling,
- Date and time of collection,
- Sample number,
- Sampling location,
- Sampling methodology,
- Container description,
- Waste description (sludge, liquid, contaminated soil, etc.),
- Description of generating process or originating waste (IDC and container barcode number),
- Name and address of waste generator; name and address of field contact; number and volume of samples,
- List of suspected hazardous materials,
- Field observations,
- Field measurements (e.g., pH),
- Destination, and
- Signature of collector.

A chain-of-custody record is assigned to each sample or group of samples. The record includes the sample number, date and time of collection, sample description, and signatures of the collector and subsequent custodians. Upon disposition of the sample, the chain-of-custody

record is maintained in the Operating Record. Additional QA/QC procedures are described in the AMWTP Waste Characterization QAPjP.

C-4c Frequency of Analysis [IDAPA 58.01.05.008; 40 CFR 264.13(b)(4)]

Characterization is accomplished on a waste stream basis. The number of samples required per non-debris waste stream is evaluated statistically per the AMWTP Waste Characterization QAPjP. The initial number of samples is estimated to be five samples per non-debris waste stream.

Upon collection and analysis of the preliminary samples, or at any time after the preliminary samples have been analyzed, the AMWTP may assign HWNs to a waste stream. For waste streams with calculated upper confidence limits below the regulatory threshold, the AMWTP collects the statistically required number of samples if the AMWTP intends to establish that the constituent is below the regulatory threshold.