APPENDIX B

WASTE ANALYSIS PLAN

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
AK	acceptable knowledge
ALARA	as low as reasonably achievable
ASTM	American Society for Testing and Materials
CBFO	Carlsbad Field Office
CCP	Centralized Characterization Project
CFR	Code of Federal Regulations
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FFCO	Federal Facilities Compliance Order
HE	high explosives
HEPA	high-efficiency particulate air
ITRI	Inhalation Toxicology Research Institute
LANL	Los Alamos National Laboratory
LDR	Land Disposal Restrictions
MLLW	mixed low-level waste(s)
MTRUW	mixed transuranic waste(s)
NCR	non-conformance report
NNSA	National Nuclear Security Administration
ppm	parts per million
ppmw	parts per million by weight
Pu-238	plutonium-238

LIST OF ABBREVIATIONS/ACRONYMS (Continued)

QA	quality assurance
QAPjP	"Los Alamos National Laboratory Transuranic Waste Quality Assurance Project Plan"
QC	quality control
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RTL	regulatory threshold limit
RTR	real-time radiography
SOP	standard operating procedure
SVOC	semivolatile organic compound
STP	Site Treatment Plan
SW-846	EPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
TA	technical area
TC	toxicity characteristic
TCLP	Toxicity Characteristic Leaching Procedure
TRU	transuranic
TRUWF	Transuranic Waste Facility
TSDF	treatment, storage, and disposal facility
UHC	underlying hazardous constituents
VO	volatile organic
VOC	volatile organic compound
WAC	waste acceptance criteria
WAP	waste analysis plan

LIST OF ABBREVIATIONS/ACRONYMS (Continued)

WIPP	Waste Isolation Pilot Plant
WIPP WAC	"Waste Acceptance Criteria for the Waste Isolation Pilot Plant"
WMC	Waste Matrix Code(s)

APPENDIX B
WASTE ANALYSIS PLAN

This Waste Analysis Plan (WAP) presents information on and describes the sampling and characterization procedures used to determine the chemical and physical nature of hazardous waste, the hazardous component of mixed low-level waste (MLLW), and the hazardous component of mixed transuranic waste (MTRUW) stored at Los Alamos National Laboratory (LANL). This information is being presented to support the permit modification request for the addition of the Transuranic Waste Facility (TRUWF). This appendix has been written to encompass general waste characterization processes at LANL as they will be applied at the facility; however, where applicable, the information has been limited to the waste management unit within the TRUWF. It has been prepared to meet the requirements set forth in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) incorporating Title 40 of the Code of Federal Regulations (CFR), § 264.13, revised October 1, 2003[10-01-03]. The waste analysis information contained in this WAP is used for characterization of wastes managed in containers. Waste characterization processes for other treatment methods conducted at LANL have been included in the most recent revision of the LANL General Part B Permit Application (LANL, 2003), hereinafter referred to as the LANL General Part B. Additional waste analysis requirements are specified in 20.4.1 NMAC § 270.14(b), and 20.4.1 NMAC § 268.7 [10-01-03]. The content of this WAP follows the guidance provided in "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes, A Guidance Manual" (U.S. Environmental Protection Agency [EPA], 1994). It is organized as follows:

Section B.1 Facility Description: Includes a general description of LANL, general descriptions of the waste streams stored and treated, and the activities that generate waste at LANL.

Section B.2 Waste Analysis Parameters: Includes a discussion of the proposed analytical parameters and methods used by LANL for storage of waste and the criteria/rationale for the parameter selection.

Section B.3 Characterization Procedures: Includes the characterization approach (e.g., acceptable knowledge, sampling and analysis) for each waste classification stored at LANL.

Section B.4 Off-Site Waste: Includes a discussion of procedures in place for acceptance of waste from off-site facilities.

Section B.5 Special Procedural Requirements: Includes a discussion of the procedures in place for ignitable, reactive, and incompatible wastes; procedures to ensure compliance with land disposal restrictions (LDR); and procedures to ensure compliance with Subpart BB and CC requirements.

Section B.6 References.

Table B-1 summarizes applicable regulatory requirements and the corresponding location where the requirement is addressed in this appendix.

Throughout this document, generator waste characterization is described as the preliminary source of information at LANL determining the identification and subsequent management of the waste. Generator waste characterization requirements are addressed in 20.4.1 NMAC, Subpart III, Part 262, and the information included in this permit modification package is not intended to result in hazardous waste facility permit conditions being applied to the waste-generation process or the procedures covered by that regulation. The information presented is intended to discuss how the waste characterization data are reviewed and used by LANL waste management units and organizations in compliance with the 20.4.1 NMAC, Subpart V, Part 264, and 20.4.1 NMAC, Subpart VIII, Part 268, regulatory requirements.

B.1 FACILITY DESCRIPTION [20.4.1 NMAC § 270.14(b)(1)]

LANL is located in Los Alamos County in north-central New Mexico. It is approximately 60 miles north-northeast of Albuquerque and 25 miles northwest of Santa Fe. LANL and the associated residential and commercial areas of Los Alamos County are situated on the Pajarito Plateau. A detailed description of the LANL facility is included in Appendix A of the most recent version of the LANL General Part B Permit Application (LANL, 2003) and a detailed description of the TRUWF is included in Appendix A of this permit modification request.

LANL's central mission is the reduction of global nuclear danger supported by research that also contributes to conventional defense, civilian, and industrial needs. This includes programs in nuclear, medium energy, and space physics; hydrodynamics; conventional explosives; chemistry; metallurgy; radiochemistry; space nuclear systems; controlled thermonuclear fusion; laser research; environmental technology; geothermal, solar, and fossil energy research; nuclear safeguards; biomedicine, health, and biotechnology; and industrial partnerships. LANL is owned by the National

Nuclear Security Administration of the U.S. Department of Energy (DOE-NNSA) and is operated jointly by DOE-NNSA and the Los Alamos National Security, LLC.

B.1.1 Facility Waste-Generating Processes and Activities

Wastes are generated at LANL primarily from research and development (R&D) activities, processing and recovery operations, decontamination and decommissioning (D&D) projects, and corrective action activities. Waste stream descriptions provide information on the most common waste streams and their generation processes. These descriptions are not intended to be inclusive of every current or future waste stream or waste generation process at LANL. In any event, additional EPA Hazardous Waste Numbers will be added to the future Technical Area (TA) 52 section of the of the most recent version of the "Los Alamos National Laboratory General Part A Permit Application." That information presents waste descriptions potentially generated at LANL. Tables B-2 through B-5 present information on hazardous wastes, MLLW, and MTRUW generated, stored, managed at LANL and ultimately disposed at off-site facilities. Wastes generated from these types of processes and activities may also be received from off-site facilities, as described in Supplement 1 of the most recent General Part B (LANL, 2003). Wastes generated at off-site facilities that may be received at LANL are described in Table B-6. These tables include brief waste descriptions, waste-generating process or activity, the characterization basis for waste designation, potential EPA Hazardous Waste Number(s), the hazardous constituent(s) listed in Appendix VIII of 20.4.1 NMAC, Subpart V, and/or the characteristic(s) defined at 20.4.1 NMAC, Subpart V, Part 264, Subpart C, that make the waste hazardous, and the regulatory limits, as appropriate. These tables are provided for information purposes only.

B.1.2 Stored Waste

Hazardous waste, MLLW, and MTRUW are stored at various container storage units throughout LANL. The following sections contain general descriptions of these wastes and the processes that generate them.

B.1.2.1 Hazardous Waste

The criteria for establishing a waste as a hazardous waste are provided in 20.4.1 NMAC, Subpart II [10-01-03]. A waste is considered hazardous if it meets the definition of a solid waste described in 20.4.1 NMAC § 261.2 [10-01-03]; is not exempted from regulation as a hazardous waste under 20.4.1 NMAC § 261.4 [10-01-03]; and exhibits any of the characteristics of hazardous waste

identified in 20.4.1 NMAC, Subpart II, Part 261, Subpart C, or is listed in 20.4.1 NMAC, Subpart II, Part 261, Subpart D [10-01-03].

Hazardous wastes are generated at LANL primarily from R&D activities, general facility operations, D&D projects, and corrective action activities. These waste streams include spent solvents, contaminated solid wastes, paint and related wastes, photographic and photocopier wastes, corrosive liquids, solid metals and metallic compounds, contaminated noncorrosive aqueous and nonaqueous solutions and sludges, mercury wastes, used batteries and battery fluids, unused off-specification commercial chemical products, gas cylinder waste, asbestos, inorganics, organics, high explosives (HE), PCBs, corrective action soils and sludges, corrective action aqueous liquids, and corrective action debris. Hazardous waste matching some of these waste stream descriptions may also require management at the TRUWF as a result of segregation of waste items from MTRUW waste streams and from recharacterization of items as hazardous only based upon certification procedures and radioanalysis. Hazardous waste streams may be of uniform physical composition (i.e., homogeneous) or of dissimilar/diverse composition (i.e., heterogeneous). Homogeneous waste is defined as waste that contains only one material or substance or waste that has its components mixed so that consistent samples can be drawn throughout. Homogeneous waste streams can be either solids or liquids. Heterogeneous waste is defined as waste that contains multiple components that are separate because of density or specific gravity, are located in different places within the mixture, or are discrete and different articles. Heterogeneous wastes (e.g., debris) do not lend themselves to representative sampling and analysis. Descriptions of these routinely handled hazardous waste streams and their waste-generating processes are provided below and summarized in Table B-2.

Spent Solvents

This waste stream consists of spent solvents and spent solvent mixtures that may contain organic or inorganic compounds, heavy metals, oils, and other contaminants. Waste-generating activities include R&D, laser research, organic and inorganic chemistry research, cleaning, and degreasing.

Contaminated Solid Wastes

Contaminated solid wastes (i.e., wastes of a solid physical form) include mixtures of rags, spill cleanup materials, wipes, gloves, filters, plastic and paper products, and personal protective equipment. This waste stream may also consist of disposable equipment contaminated with

organic or inorganic compounds, heavy metals, oils, and other contaminants. Waste-generating activities include machining operations, chemistry research, D&D projects, metal finishing operations, and general maintenance operations.

Paint and Related Wastes

Paint and paint-related wastes consist of excess paint, paint strippers/thinners, and sludges of paints and thinners. Possible contaminants include heavy metals used as paint pigments and solvents contained in thinners and lacquers. Waste-generating activities include painting and finishing operations and general facility maintenance.

Photographic and Photocopier Wastes

Photographic wastes include spent or excess film developers, fixer solutions, and bleach/etching solutions that may be contaminated with heavy metals. Photocopier wastes include kerosene-based toners and dispersants. This waste stream is generated from photographic film processing and photocopier operations.

Corrosive Liquid Wastes

These wastes consist of acidic or alkaline solutions that may contain organics, inorganics, metals, oils, and other contaminants. Waste-generating activities include analytical chemistry research, electro-etching, and electro-polishing.

Solid Metals and Metallic Compounds

This waste stream consists of metal chips and turnings from machining and cutting operations. It also consists of metal powders; metal salts; metal sheets; reactive metals used in synthesis reactions; solders from electronic manufacturing, repair, and brazing operations; and grinding operations. Other solid metals and metallic compounds include lead shot, bricks, plate, and shielding.

Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges

This waste stream consists of noncorrosive aqueous and nonaqueous solutions and sludges that are contaminated with hazardous wastes or hazardous residues. Waste-generating activities include vacuum pump maintenance, analytical spectrometry, equipment cleaning and maintenance, vehicle maintenance, synthesis reactions, metal-polishing operations, and chemical research.

Mercury Wastes

Mercury wastes include free elemental mercury, mercuric compounds, articles and instruments containing mercury, fluorescent light fixtures, and gels containing mercuric compounds. Waste-generating activities include lamp replacement, chemical research, mercury spill cleanup, and equipment cleaning and maintenance.

Used Batteries and Battery Fluids

This waste stream consists of used batteries and battery fluids that contain heavy metals such as cadmium, lead, mercury, and silver. Waste-generating activities include routine equipment maintenance.

Unused/Off-specification Commercial Chemical Products

This waste stream consists of discarded solid and liquid chemical reagents that are off-specification, unused, or outdated. This waste stream also includes spill residues and containers containing original product residues that are unused.

Gas Cylinder Waste

This waste stream consists of pressurized gas cylinders, including aerosol cans, which may contain regulated hazardous metals, organic compounds, or exhibit the hazardous characteristics of ignitability, corrosivity, and reactivity.

Soils/Environmental Media and Sludges

This waste stream consists of environmental media and sludges generated through corrective action and D&D activities, including site decommissioning, site characterization, and site remediation. Waste-generating activities include septic tank and detention basin closure, removal actions, and other remedial actions and site closures.

Aqueous Liquids

This waste stream consists of liquids generated during corrective action and D&D activities, including decontamination of remedial equipment, drilling fluids and well development fluids, septic tank liquids, and contaminated stormwater runoff.

Debris

This waste stream consists of debris (such as asphalt, concrete, vitrified clay/cast iron pipe, steel baffles, and building materials) generated through corrective action and D&D activities, including site decommissioning, site characterization, and site remediation. Waste-generating activities include septic tank and detention basin closure, removal actions, and other remedial actions and site closures.

B.1.2.2 Mixed Low-Level Waste

Low-level waste is defined in DOE Order 435.1, "Radioactive Waste Management" (DOE, 1999), as "Radioactive waste that is not classified as high-level waste, spent nuclear fuel, transuranic waste, by-product material [as defined in Section 11(e)(2) of the *Atomic Energy Act,* as amended], or naturally occurring radioactive material". MLLW is any waste that has both a hazardous waste component and a low-level waste component, as defined above. For MLLW, this WAP addresses only the hazardous component.

MLLW is generated at LANL primarily from R&D activities, processing and recovery operations, D&D projects, and corrective action activities. MLLW matching these waste stream descriptions may also require management at the TRUWF as a result of segregation of waste items from MTRUW waste streams and from recharacterization of items as MLLW based upon certification procedures and radioanalysis. MLLW streams may be homogeneous or heterogeneous, as defined in Section B.1.2.1. Descriptions of the MLLW and their waste-generating processes are provided below and summarized in Table B-3. These descriptions are extracted primarily from LANL's "Report for the Characterization Review of Low-Level Mixed Waste" (LANL, 1995a) and "Federal Facilities Compliance Order Site Treatment Plan Background Volume" (LANL, 1995b).

Contaminated Soils

Soil waste contaminated with heavy metals is generated during D&D and corrective action activities at various locations throughout LANL.

Inorganic Oxidizers

Discarded reagent powders and crystalline materials comprise this waste stream. Most of these items are in the original manufacturer's containers, some of which may be hydrated. Many of these containers are unopened but are suspected to have radioactive surface contamination. Waste-generating activities include D&D of research laboratories and R&D.

Lead Waste

Lead waste consists of contaminated and activated lead shielding used as radiation shielding, inseparable lead, lead blankets, and lead requiring sorting. It is generated primarily from radioisotope experiments and other reactor, accelerator, laser, and x-ray activities. The lead may be in the form of sheets, pigs, bricks, shot, shavings, slag, dross, and other shapes. Radioactive contamination on the surface of the lead may be removable and the lead can then be recycled or reused.

Noncombustible Debris

Noncombustible debris consists of discarded hazardous and contaminated scrap metals that are generated by maintenance, D&D of research laboratories or equipment, R&D, and corrective action activities. Additionally, discarded bricks and glass are generated through dismantling of LANL buildings, including plating shops and machine sheds. The waste may be considered hazardous due to the metal content or by virtue of contamination during use.

Combustible Debris

Maintenance, D&D, R&D, and corrective action activities generate rags and combustible debris with heavy metals and/or organics, some of which contain residual liquids. Examples include solvents and lubricants that are used in metal-cutting operations. Much of this waste is generated during the processing of lead and barium, resulting in heavy metal contamination.

Organic-Contaminated Noncombustible Solids

This waste stream includes absorbed organic chemicals, laboratory trash, and discarded equipment. Absorbed organic chemical waste is comprised of drums containing vermiculite or other inorganic sorbents used to absorb chemicals from spills and routine maintenance operations.

Laboratory trash consists of noncombustible solid materials with organic contamination. The laboratory debris includes reagent bottles, broken glassware, and disposable lab ware. Large quantities of chemicals are not placed in this trash; however, residual liquids or powders may have remained on some of the discarded material.

Discarded equipment with heavy metals and solvents primarily includes equipment and broken glassware that may have contained residual solvents.

Organic-Contaminated Combustible Solids

This waste stream consists of waste similar to combustible debris waste, along with rags, cardboard, protective clothing, and paint-stripper trash. This waste stream is potentially contaminated with methyl ethyl ketone and other solvents. Waste-generating activities include maintenance, D&D, and corrective action activities.

Water-Reactive Wastes

Water-reactive wastes consist of reactive metal debris generated through the cleanup of HE firing-site debris and from machining and disassembly of test components. This waste stream includes calcium, lithium hydride, lithium metal, and magnesium.

Mercury Wastes

This waste stream includes elemental mercury and mercury-contaminated instruments and equipment waste stream that consist of discarded or broken equipment containing liquid mercury. The instruments and equipment include broken thermometers, vacuum tubes, vacuum pumps with residual mercury, activated or contaminated fluorescent light bulbs, and mercury absorbed into a paper or solid matrix. Most of this waste is generated by cleanup operations and could not effectively be recycled or separated from its containing vessel.

Spent Solvents and Contaminated Solvent Mixtures

This waste stream is comprised of spent solvents and spent solvent mixtures that contain organic or inorganic compounds, heavy metals, oils, and/or other contaminants. Waste-generating activities include a wide variety of maintenance, cleaning and degreasing, R&D, and processing operations, such as extraction, bench-scale experimental inorganic chemistry, environmental analysis, and radiochemistry.

Corrosive Liquid Wastes

This waste stream consists of acidic or alkaline solutions that contain organics, inorganics, metals, oils, and/or other contaminants. Waste-generating activities include radiochemistry research, plutonium processing, and analytical chemistry.

Liquids Contaminated with Heavy Metals and/or Organics

This waste stream consists of aqueous and nonaqueous solutions that contain heavy metals and/or organics. Waste-generating activities include metal-polishing operations, radiochemistry research, and corrective action activities.

Oil Wastes

Oil wastes at LANL are generated during equipment maintenance operations. Possible contaminants in this waste stream include heavy metals and solvents.

Unused Reagent Chemical Wastes

Many different types of discarded off-specification unused solid and liquid reagent chemical wastes are generated at LANL by R&D programs. Most of these items are in their original containers.

Gas Cylinder Waste

This waste stream consists of pressurized gas cylinders, including aerosol cans, which contain regulated hazardous metals, organic compounds, or exhibit the hazardous characteristics of ignitability, corrosivity, and reactivity.

B.1.2.3 Mixed Transuranic Waste

Transuranic (TRU) waste is defined in DOE Order 435.1, "Radioactive Waste Management" (DOE, 1999), as follows: "Radioactive waste containing more than 100 nanocuries (3700 becquerels) per gram of waste, with half-lives greater than 20 years." Transuranic isotopes are those with atomic numbers greater than 92. MTRUW contains both a hazardous waste component and a TRU waste component. For MTRUW, this WAP addresses only the hazardous component. The system of MTRUW stream descriptions presented below is consistent with the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit. This information may be superseded by any changes to the "Waste Acceptance Criteria for the Waste Isolation Pilot Plant" (WIPP WAC).

MTRUW is generated at LANL primarily from R&D activities, processing and recovery operations, and D&D projects. Limited quantities of MTRUW from off-site facilities will be accepted at LANL for additional characterization and management. MTRUW streams at LANL include four broad categories that can be described by a Summary Category Group, which is further subdivided into Waste Matrix Codes (WMC). Summary Category Groups are used to define waste characterization groupings for the "Federal Facility Compliance Order (Los Alamos National Laboratory)" (New Mexico Environment Department [NMED], 1995) requirements and are based on the physical and chemical forms of the waste. Complete descriptions of the Summary Category Groups are available in "DOE Waste Treatability Groups Guidance" (DOE, 1995). The Summary Category Groups that are applicable to the MTRUW stored and, in some cases, treated at LANL are listed below.

- *Summary Category Group S3000, Homogeneous Solids*: defined as solid waste materials, excluding soil/gravel, that do not meet the EPA LDR criteria for classification as debris.

- *Summary Category Group S4000, Soil/Gravel*: defined as solid waste materials that are at least 50 percent by volume soil/gravel.

- *Summary Category Group S5000, Debris*: defined as a heterogeneous waste stream that is at least 50 percent by volume solid materials exceeding a 2.36-inch particle size that is intended for disposal and is a manufactured object, plant or animal matter, or natural geologic material. Particle sizes 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.

- *Summary Category Group L1000, Aqueous Liquids/Slurries*: defined as aqueous liquids and slurries that meet the EPA LDR criteria for wastewaters (i.e., <1 percent total suspended solids).

Summary Category Groups are applied to MTRUW streams as a general categorization scheme to distinguish between waste types. More specific waste identification systems (i.e., WMC and LANL TRU Waste Stream identification (ID) numbers) are used for supplementary purposes as part of waste management operations at LANL. The WMCs that are applicable to the solid MTRUW stored at LANL are:

- *WMC S3100, Inorganic Homogeneous Solid Waste*: includes mixed inorganic homogeneous waste (cemented inorganics, organics on vermiculite, non-cemented, salts, and cemented organics).

- *WMC S5300, Organic Debris Waste*: consists of mixed combustible debris waste (plastic, cellulosics, and rubber).

- *WMC S5400, Heterogeneous Debris Waste*: includes mixed heterogeneous debris waste (varying amounts of combustible and noncombustible debris, with a small amount of homogeneous waste present).

Solid MTRUW is assigned a WMC and is further identified with a LANL TRU Waste Stream ID number. Using the WMC, waste streams are further delineated based on the following prioritized criteria: waste-generating process (to the degree to which waste has been segregated by process); Summary Category Group (i.e., homogeneous or debris waste); waste matrix; and hazardous chemical content (i.e., organics and/or inorganics). The following are general MTRUW stream descriptions:

- Homogeneous Inorganic, Cemented: includes solidified aqueous or homogeneous inorganic solids, solidified inorganic process solids, leached process residues, evaporator bottoms/salts, and/or cement paste.

- Homogeneous Inorganic, Cemented Organics: major portion of the waste is cement (i.e., inorganic) containing a minor portion of cemented solidified organic process solids.

- Homogeneous Inorganic, Non-cemented: includes solid (non-cemented) inorganic waste, ash, dewatered aqueous sludge, and/or chemical treatment sludge.

- Homogeneous Inorganic, Salts: includes pyrochemical, nitrate, and/or chloride salts; hydroxide cake; and/or other salt waste.

- Homogeneous Inorganic, Vermiculite: includes vermiculite-absorbed hydrocarbon oil, vermiculite-absorbed silicon-based liquid, and solidified (non-cemented) organic waste.

- Soil: includes all radioactive-contaminated soil.

- Combustible debris: includes greater than 50% by volume combustible decontamination waste, cellulosics, plastics, rubber, laboratory trash, building debris, hot cell waste, and/or other combustibles.

- Heterogeneous debris: includes greater than 50% by volume noncombustible waste, metal scrap, glass, metal waste, metal crucibles and dies, precious metals, filter media and residue, beryllium-contaminated debris, ion-exchange resins, irradiation sources, firing point sources, leaded rubber, graphite waste, high-efficiency particulate air (HEPA) filter waste, skull and oxide, slag and porcelain, and/or other noncombustible waste.

The WMCs correspond to other historical and current waste identification systems used at LANL. Table B-4 lists the MTRUW streams stored at LANL by their Summary Category Group, WMC, and

general matrix description, and provides a cross-reference between past and present waste identification systems.

LANL TRU Waste Stream ID numbers are applied to the MTRUW streams described above. LANL TRU Waste Stream ID numbers are assigned the prefix "LA-", followed by a unique identifier that further delineates the waste stream. The following paragraphs provide examples of the delineated waste streams for the MTRUW stored and, in some cases, treated at LANL. MTRUW information is summarized in Table B-5.

LA-TA-55-19: Mixed Combustible Debris Waste

This waste stream consists of mixed combustible debris waste generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance. The debris waste includes paper, rags, plastic, rubber, wood-based HEPA filters, and other plastic-based and cellulose-based items.

LA-TA-55-30: Mixed Heterogeneous Debris Waste

This waste stream consists of mixed heterogeneous debris waste generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance. The waste includes plutonium-contaminated noncombustible and combustible debris waste.

LA-MIN01-CIN: Mixed Inorganic Homogeneous Waste, Cemented Inorganics

This waste stream consists of mixed inorganic homogeneous waste generated by plutonium recovery, R&D processes, facility and equipment operations and maintenance, and liquid waste treatment operations. The waste includes cemented sludge, solidified aqueous waste, and solidified inorganic process solids.

LA-MIN02-V: Mixed Inorganic Homogeneous Waste, Organics on Vermiculite

This waste stream consists of mixed inorganic homogeneous waste generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance. The waste is comprised of organic liquids (oils and solvents) adsorbed on vermiculite.

LA-MIN03-NC: Mixed Inorganic Homogeneous Waste, Non-cemented

This waste stream consists of mixed inorganic homogeneous waste generated by plutonium recovery, R&D processes, and liquid waste treatment operations. It consists of vacuum filter cake solid waste.

LA-MIN04-S: Mixed Inorganic Homogeneous Waste, Salts

This waste stream consists of mixed inorganic homogeneous waste generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance. It is comprised of non-cemented inorganic process solids (salts).

LA-MIN05-COR: Mixed Inorganic Homogeneous Waste, Cemented Organics

This waste stream consists of mixed inorganic homogeneous solidified (cemented) organic process solids and emulsified solvents and oils generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance.

LA-MHD02-238: Mixed Heterogeneous Debris Waste, Pu-238

This waste stream consists of mixed heterogeneous debris waste generated by plutonium-238 (Pu-238) processing operations (primarily heat-source fabrication) and facility and equipment operations and maintenance. The waste includes Pu-238 contaminated noncombustible and combustible debris waste.

LA-MIN06-C238: Mixed Inorganic Homogeneous Waste, Cemented Inorganics, Pu-238

This waste stream consists of mixed inorganic homogeneous waste comprised of solidified (cemented) inorganic process solids. This waste stream is generated by Pu-238 processing operations (primarily heat-source fabrication) and facility and equipment operations and maintenance.

LA-MHD03-DD: Mixed Heterogeneous Debris Waste, D&D

This waste stream consists of mixed heterogeneous debris waste generated from facility and equipment D&D, including associated sectioning, size reduction, and packaging operations. The waste is comprised of plutonium-contaminated noncombustible and combustible debris waste.

LA-MHD05-ITRI: Mixed Heterogeneous Debris Waste, Inhalation Toxicology Research Institute

This waste stream consists of mixed heterogeneous debris generated between 1975 and 1984 by the Inhalation Toxicology Research Institute (ITRI), which is currently operated by Lovelace at the Kirtland Air Force Base, New Mexico. The waste is comprised of laboratory waste that may contain rags, tools, and biological waste contaminated with plutonium-239.

LA-MHD07-SNL: Mixed Heterogeneous Debris Waste, Sandia National Laboratory

This waste stream consists of mixed heterogeneous debris waste generated by Sandia National Laboratories. This waste stream may contain lead (D008).

LA-MHD04-RH: Mixed Heterogeneous Debris Waste, Remote-Handled

This waste stream consists of mixed remote-handled heterogeneous debris waste generated by hot cell operations. This waste is comprised of combustible and noncombustible waste.

Sandia National Laboratories/New Mexico - Generated Waste

MTRUW managed at Sandia National Laboratories/New Mexico will be received and stored at LANL for waste certification purposes prior to subsequent reshipment for final disposition. The waste stream consists of combustible and noncombustible debris and may include metals, cellulosics, rubber, plastics, organic matrices, and inorganic materials (see Table B-6).

B.1.3 Treated Wastes

Containerized waste will be prepared and certified for shipment at the TA-52 TRUWF. As part of this procedure, the waste in the containers may need to be treated for transport to and to meet waste acceptance criteria for the WIPP or other off-site facilities. Treatment methods that will be used at the TRUWF will include absorption, neutralization, cementing or grouting to solidify liquid containing wastes, and the puncturing of aerosol cans. The most common treatment method anticipated is absorption of liquids in the containers. Further discussion regarding these treatment methods is contained in Appendix G of this document. Characterization of the treated wastes will occur in accordance with this plan. Waste treatment methods that are not conducted at the TRUWF, but are conducted at other units at LANL (e.g. open burning and open detonation), are covered in Appendix B of the most recent version of the LANL General Part B (LANL, 2003).

B.2 WASTE ANALYSIS PARAMETERS [20.4.1 NMAC § 264.13(A)(1)]

Detailed chemical and physical characterization will be performed on hazardous wastes, the hazardous component of MLLW, the hazardous component of MTRUW, HE wastes, and HE-contaminated wastes for management purposes, as required by 20.4.1 NMAC § 264.13. As necessary, the waste analysis parameters will be selected to ensure that the waste characterization documentation will contain the information necessary to properly manage the waste in accordance with Resource Conservation and Recovery Act (RCRA) general facility standards in 20.4.1 NMAC, Subpart V, Part 264, and LDR requirements in 20.4.1 NMAC, Subpart VIII, Part 268.

B.2.1 Proposed Analytical Parameters and Methods [20.4.1 NMAC § 264.13(b)(1), and 20.4.1 NMAC § 270.14(b)(2)]

Analytical parameters and characterization methods that will be used for hazardous wastes, MLLW, and MTRUW generated at LANL are summarized in Tables B-7 through B-9. The parameters listed below will be used, as necessary, to determine the RCRA regulatory status of the wastes listed in Section B.1.

- Acceptable Knowledge (AK)
- Sampling and analysis to determine the presence and concentrations of:
  - RCRA-regulated metals
  - RCRA-regulated volatile organic compounds (VOC)
  - RCRA-regulated semivolatile organic compounds (SVOC)
- MTRUW characterization sampling methods
  - Headspace gas sampling to determine the presence of VOCs in container headspace
  - Physical waste form characterization through real-time radiography (RTR) and/or visual examination to verify the absence of prohibited items (e.g., liquids and sealed >4 liter containers).
- Flash point characterization
- pH characterization
- Reactivity characterization
- Additional characterization data

B.2.2 Criteria and Rationale for Parameter Selection [20.4.1 NMAC § 264.13(b)(1)]

Parameter selection for waste characterization is based on the physical form of the waste (e.g., debris) and on knowledge of the process generating the waste. To determine whether a solid waste is hazardous, LANL uses AK (which includes process knowledge), supplemented by sampling and analysis, if necessary, as described in Sections B.3.1.1 and B.3.1.2. The analytical parameters selected to confirm knowledge-based waste characterization for hazardous waste, MLLW, and MTRUW, and the rationale for the selected parameters are identified in Tables B-7, B-8, and B-9, respectively. MTRUW characterization incorporates characterization procedures from the WIPP permit (NMED, 2002) requirements, which are based on knowledge of raw materials and physical/chemical processes of waste-generating activities and by verification methods. Additional characterization procedures will be implemented as needed to meet the requirements of the WIPP permit or other LANL waste management conditions.

Appendix III of 20.4.1 NMAC, Subpart II, Part 261, provides references which list approved analytical methods used to determine the concentrations of hazardous constituents in the liquid and solid fractions and extracts of waste samples. All the methods are fully described in the most recent version of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (*SW-846)*. These and other approved methods will be used, as necessary, to determine whether a waste stream is hazardous. Samples will not be analyzed for all listed hazardous constituents, only those that are most likely to be present based on the source of the waste stream.

Detailed instructions for conducting Toxicity Characteristic Leaching Procedure (TCLP) waste analysis are found in the most recent version of *SW-846* and are incorporated by reference into 20.4.1 NMAC, Subpart II, Part 261, Appendices II and III. Also listed in the most recent version of *SW-846* is the appropriate analytical method for each hazardous constituent required to determine if the waste contains a contaminant in excess of the maximum contaminant concentration regulated under 20.4.1 NMAC, Subpart II, Part 261. TCLP is a method for leaching hazardous constituents from the solid portion of the waste and is used only if the solids constitute more than 0.5% of the waste by weight. The laboratory can also forego extraction if: 1) total analysis of the waste shows the concentrations of the analytes are so low, an extract of the waste could not contain analytes at concentrations above the regulatory limits; or 2) analysis of any liquid portion of the waste contains such high concentrations of hazardous constituents that, even accounting for dilution, the entire sample would be hazardous.

Many RCRA hazardous wastes are restricted from land disposal under the Hazardous and Solid Waste Amendments unless they are treated first to substantially diminish their toxicity and reduce the likelihood that hazardous constituents will migrate from the disposal site. As required in 20.4.1 NMAC, Subpart VIII, Part 268, each waste shipment must be accompanied by a notification stating whether the restricted waste meets specific LDR treatment standards promulgated for hazardous constituents, or is otherwise exempt. In most cases, the notification can be completed after laboratory analysis of the waste. If an LDR notification is based solely on knowledge of the waste, the supporting documentation will be kept on record, in accordance with 20.4.1 NMAC § 268.7.

B.3 CHARACTERIZATION PROCEDURES [20.4.1 NMAC §§ 264.13(a)(1) AND 264.13(b)(2), AND 20.4.1 NMAC § 270.14(b)(2)]

Throughout LANL, it is required that characterization of wastes be considered before a waste-generating process will begin. The preliminary characterization of waste begins prior to actual generation (at the point of concept and design of a process or system), which in turn allows the generator to determine whether AK, sampling and analysis, or a combination of the two will be required prior to actual waste characterization for transport to one of the permitted storage facilities at LANL.

The approach to characterization of hazardous wastes, MLLW, and MTRUW is based on the chemical, physical, and radiological nature of the waste stream. Characterization procedures require that information for the waste stream be provided on waste characterization documentation, accompanied by sampling and analysis data or AK documentation. The waste characterization documentation will be submitted to LANL's waste management personnel for review, classification, and approval prior to acceptance at the TRUWF. This characterization is accomplished by using AK and/or sampling and analysis, which are described in the following sections.

Trained personnel review the waste characterization documentation for adequacy and waste acceptance criteria (WAC) acceptability. Training for use of waste characterization documentation is included in a facility waste documentation course. This training provides step-by-step instructions on how to complete forms for characterizing wastes. If the documentation is incomplete or does not contain sufficient information to adequately characterize or classify the waste, the documentation is returned to the generator for additional information. Examples of further documentation that may be

requested include more detailed process knowledge and description or additional/new analytical data to meet WAC requirements for the off-site treatment, storage, or disposal facility (TSDF).

Waste characterization documentation allows waste classification and assignment of EPA Hazardous Waste Numbers, as needed; preparation of LDR documentation; and proper management of the waste. Once the waste characterization documentation is reviewed, classified, and approved, the generator is notified and paperwork is prepared for shipping. The shipping documentation is submitted to LANL's waste management personnel and reviewed against the waste characterization documentation and Department of Transportation regulations. If approved, the waste shipment is scheduled for transport to the appropriate TSDF. If the shipping documentation is inadequate or does not correspond with the characterization documentation, the shipping documentation is returned to the generator for corrections.

Upon receipt and prior to accepting the waste containers for storage at the container storage/treatment unit at the TRUWF, waste shipments will be inspected to ensure that the shipping documentation and the waste characterization documentation have the proper approvals in addition to ensuring that compliance with the WAC and all federal and state regulations are met. Both the waste characterization documentation and the shipping documentation will become part of the operating record upon receipt of the waste. These records will be made available within a reasonable timeframe to the NMED, upon request.

Reevaluation of initial characterization information is performed to verify the accuracy of the initial waste characterization, to ensure that applicable treatment standards have been met, when there is a change in a waste-generating process, when the generator requests a review, or when analytical results indicate a change in a waste stream. Waste streams are reevaluated annually to verify that they have not changed. This annual reevaluation will be accomplished through review and recertification of applicable waste characterization documentation, and the documented reevaluation will be maintained in the facility operating record. Any information that indicates a change in the process that generates the waste and/or affects the waste will require the waste to be recharacterized.

B.3.1 Hazardous and Mixed Low-Level Waste Characterization

Characterization procedures for hazardous waste and MLLW are selected based on the physical nature of the waste stream (e.g., homogeneous or heterogeneous waste). Homogeneous solid waste will be characterized for the presence of hazardous components of the waste (i.e., VOCs, SVOCs, and metals) on the basis of AK and, if necessary, sampling and analysis. Heterogeneous solid waste is typically characterized on the basis of AK for the following reasons: (1) the physical, chemical, and/or radiological nature of the waste makes it difficult to obtain representative samples; (2) the lack of appropriate sampling methodology; and (3) for MLLW, safety concerns associated with unnecessary exposure to the radioactive component of the waste (i.e., as low as reasonably achievable [ALARA] concerns). In the event AK is used to characterize the waste, characterization documents are reviewed with the help of subject matter experts, when necessary, to achieve the most comprehensive characterization available before waste is approved for transport to a permitted container storage unit.

Chemicals of an unknown nature are handled on a case-by-case basis. The individual waste is initially characterized by knowledge of the operations and activities that were performed in the specific area in which the waste was generated. This information is used to restrict the choices of initial waste analysis to a smaller population of chemicals and is not the sole basis of waste characterization. In the event that RCRA hazardous wastes are present in the initial waste analysis, more definitive AK is obtained, including, as appropriate, further analysis for sufficient and complete waste characterization prior to waste acceptance at a permitted storage unit.

For purposes of managing unknown wastes, a small volume is defined at LANL as one liquid gallon (approximately four liters) or less. The rationale for the small volume designation is that this is the minimum quantity of sample needed to test if the waste is hazardous. At and below this limit, the sample may be consumed in the analytical procedure. Small volumes of unknown wastes are typically analyzed for pH, flash point, and reactivity. This allows the material to be categorized for further management.

Volumes greater than one gallon (four liters) of a single unknown waste allow a more detailed analytical scheme. These wastes are tested for ignitability, corrosivity, reactivity, toxicity characteristics, and/or any other parameters indicated by the initial data gathered on the material.

Sufficient detail must be reported to allow the assignment of the proper EPA Hazardous Waste Number(s) to the waste. Characterization methods used are provided in Tables B-7 and B-8.

Information regarding the presence of free liquids in containers of hazardous waste and MLLW is obtained through generator waste-characterization knowledge, visual examinations, and/or the Paint Filter Liquids Test.

B.3.1.1 Acceptable Knowledge [20.4.1 NMAC §§ 264.13(a)(2) and 264.13(b)(5), and 20.4.1 NMAC § 270.14(b)(2)]

The physical, chemical, and radiological nature of some waste forms (e.g., heterogeneous) makes collection of representative samples for characterization difficult. This difficulty arises from several factors, some of which include: waste streams that contain disparate elements; disparate elements may need to be segregated into similar forms; large objects which cannot fit within standard size sample containers; and laboratories which do not have the capability to sample large objects (EPA, 1992). Other difficulties arise from health and safety risks to personnel due to potential exposure to radioactive material (i.e., ALARA concerns) or explosive material.

Acceptable knowledge is a method used to characterize the waste streams utilizing process knowledge and additional waste analysis data. According to EPA guidance, *acceptable knowledge* is broadly defined to include process knowledge, additional characterization data, and/or facility records of analysis (EPA, 1994A). Consistent with the 1994 guidance, EPA defined "acceptable knowledge" as it applies to TRU waste destined for WIPP as "any information about the process used to generate the waste, material inputs to the process, and the time period during which the waste was generated . . ." [Code of Federal Regulations, Title 40 (40 CFR), § 194.254(c)(3)]. EPA recognizes AK as an "integral part" of the system for controls for waste characterization of certain types of DOE waste (see *67 FR 51930, 51942* [August 9, 2002]).

Process knowledge is described in 20.4.1 NMAC § 264.13(a)(2) [10-1-03], as data developed under 20.4.1 NMAC, Subpart II, Part 261, and existing published or documented data on a specific hazardous waste or hazardous waste generated from similar processes. EPA described *process knowledge* as knowledge of waste characteristics derived from information generated contemporaneously with the waste on the materials or processes used to generate the waste. This information may include administrative, procurement, and quality control documentation associated with the generating process, or past sampling or analytical data. Usually, the major elements of

process knowledge include information about the process used to generate the waste, material inputs to the process, and the time period during which the waste was generated (see *67 FR 51934*).

Additional characterization data includes data obtained from chemical or physical analysis or review that is not subject to RCRA protocols, such as the most recent version of *SW-846* and other approved methods, or through testing of similar or surrogate waste streams. These data can be used to determine if wastes are RCRA-regulated and to determine LDR status.

Facility records of analysis consist of waste analysis and/or physical characterization performed prior to the effective date of RCRA regulations. These analytical results must be accurate and applicable to the specified waste and should be supplemented with other existing information (e.g., published data).

For characterization, the following examples from EPA guidance (EPA, 1994A) are appropriate for the use of AK:

- Hazardous components in wastes from specific processes are well documented, such as with F-listed and K-listed wastes.
- Wastes are discarded unused commercial chemical products, reagents, or chemicals of known physical and chemical properties.
- Health and safety risks to personnel would not justify sampling and analysis (e.g., radioactive mixed waste).
- Physical nature of the waste does not lend itself to taking a laboratory sample.

Waste characterization documentation based solely on AK is reviewed by appropriate personnel, with the aid of subject matter experts if necessary, to determine if one or more of the above criteria have been met. The criteria must be provided or available for review to ensure that a valid and accurate RCRA hazardous waste characterization can be made before acceptance at a permitted container storage unit. While AK documentation will be maintained at the generator's location for at least three years as required by 20.4.1 NMAC § 262.40, it must be in a format so that waste management personnel and/or subject matter experts can obtain copies or review the documentation at the generator's site. The latter would be the case with classified or sensitive AK documentation that cannot be sent to the container storage unit due to security requirements. A

traceable identifier (i.e., process or AK document number or alphanumeric designation) is assigned by the generator on the waste characterization documentation, and must be referenced in such a way that generators can access the information at their site for as long as required by RCRA regulation.

B.3.1.1.1 Process Knowledge

For characterization, process knowledge consists of one or more of the following:

- Detailed information on a waste stream obtained from existing published or documented waste analysis data;
- Studies conducted on hazardous wastes generated by processes similar to that which generated the waste; and
- Knowledge of the materials and operations that generated the waste and that demonstrates the potential for hazardous components in the waste. For example, metals present in debris waste are often associated with specific materials (e.g., lead in leaded rubber or lead shielding).

Waste generators obtain, assemble, and prepare the process knowledge documentation for each waste stream. There are many sources of applicable documentation at LANL that are acceptable to substantiate process knowledge for a specific waste stream. Examples of documentation that are acceptable include, but are not limited to, the following:

- Process design documents (e.g., Title II Design).
- Preliminary and final safety analysis reports, unreviewed safety question determinations, and technical safety requirements.
- Standard operating procedures and detailed operating procedures, which can include a list of the raw materials or reagents, a description of the process/experiment that uses the materials, and a description of the wastes generated and how the wastes are handled.
- Waste packaging logs.
- Test plans or research project reports that describe the reagents and other raw materials used in an experiment.
- 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 practice documents (e.g., vendor information).
- Industry reports on a similar process when there is a clear connection between the LANL process/experiment and the industry's similar process/experiment.
- Previous analytical data relevant to the waste stream, including results from fingerprint analyses, spot checks, or routine waste verification sampling.
- Analytical data from studies of common industry processes that are similar to LANL processes. These data can be used to identify the chemical composition in a specific "similar" process waste stream and to determine the regulatory status of the waste.
- Material Safety Data Sheets, product labels, and other product package information.
- Sampling and analysis data from comparable waste streams.
- Documented visual inspections to confirm or identify the physical characteristics and packaging of a waste.
- Laboratory notebooks that detail the research processes and raw materials used in an experiment.
- Corrective action site characterization data, waste characterization data, waste characterization strategy documentation, and RCRA Facility Investigation documentation.

B.3.1.1.2 Additional Characterization Data

Additional characterization data used for AK include information for the waste stream provided by the generator. These data may be qualitative in nature, not subject to an approved quality control program, or performed on a similar waste stream. This information can be the result of a recent analysis of the waste, a well-documented historical analysis of the waste, and/or the analysis of a surrogate waste stream. For example, data from the analysis of nonradioactive leaded-rubber glove waste may be used to evaluate the characteristics of similar radioactive leaded-rubber glove waste. Sampling nonradioactive inputs or outputs from processes may also provide data that are useful for characterizing a similar mixed waste stream.

B.3.1.2 Sampling and Analysis [20.4.1 NMAC §§ 264.13(a)(3), 264.13(b)(2), (3), and (4), and 20.4.1 NMAC § 270.14(b)(2)]

This section discusses proposed sampling and analytical procedures and frequency of sampling applicable to hazardous waste and the hazardous component of MLLW. The approach described for characterizing these waste types is based on the radiological, physical, chemical, and

hazardous properties of the waste. If necessary for waste characterization purposes, chemical data will be obtained, as needed, through solid and liquid waste sampling techniques.

For waste streams that can be representatively sampled (i.e., homogeneous), sampling and analysis is performed when a waste lacks sufficient process information to adequately characterize the waste based on AK. A representative sample of the waste is collected and handled by means that preserve its original physical form and composition and prevent contamination or changes in concentration of the constituents to be analyzed. Analytical methods for the determination of RCRA-regulated metals, VOCs, and SVOCs are conducted to meet certain technical performance criteria and to be consistent with regulatory guidelines. Personnel involved in sampling and analysis comply with LANL-specific protocol consistent with the most recent version of *SW-846* (EPA, 1986) and/or other approved methods.

Many analytical laboratories provide sample containers and specify required minimum volumes for individual waste types or physical states. The most important determinants of sampling method and volume are the physical state of the waste (liquid, solid, sludge), the waste container (drum, tank), accessibility, waste variability, and safety concerns. Detailed sampling recommendations and guidance are provided in the most recent version of *SW-846*, Chapter 9. For solids, 500 grams in a glass container is usually adequate. Liquid sample volumes vary from one liter to approximately eight liters, depending on the number of analysis parameters and solids content. Sample jars for samples to be analyzed for VOCs must be completely filled to minimize volatilization of contaminants from the liquid into the headspace.

Sampling is performed with a device appropriate for the waste being sampled. Sampling devices include, but are not limited to, weighted bottles, bailers, or composite liquid waste samplers for sampling liquids in drums, pits, or tanks. Augers, triers, scoops, shovels, and similar types of devices are useful for sampling solid wastes in containers or other locations.

The aim of the sampling method is to obtain a sample or samples representative of the waste stream. Sampling personnel must use an understanding of the waste-generating and -handling processes to ensure samples are representative. Some wastes separate into distinct layers with time, and representative samples must include aliquots from each layer. In some cases, it may be important to use a statistical or random sampling scheme that provides for the collection of

representative samples.

A number of criteria must be considered in determining how many samples are required, how locations are selected, and how frequently sampling should be repeated. If a highly uniform waste stream is generated from a single process location, one sample collected annually is sufficient. However, if a single waste stream is a mixture of materials generated in several locations under varying conditions through time, more samples will be required, and composite sampling may be appropriate. At a minimum, the sampling must be repeated if the waste-generating process changes in a material way, or if inspection of the waste reveals it has changed.

Appendix I of 20.4.1 NMAC, Subpart II, Part 261, lists specific guidance documents that detail sampling protocols for different waste types. Waste samples collected in accordance with these protocols are considered representative by EPA. The protocols include standards developed by the American Society for Testing and Materials (ASTM) and portions of the most recent version of *SW-846*.

B.3.1.2.1 Solid Waste Analysis [20.4.1 NMAC § 264.13(b)(3)]

If necessary for waste characterization purposes, solid homogeneous waste streams are sampled and analyzed for total metal content, VOCs, and SVOCs. The sampling protocol for solid hazardous waste and MLLW is based on sampling methods approved by EPA for solid waste and soil sampling in the most recent version of *SW-846*, as well as other approved methods. These methods are designed to ensure that representative waste samples are collected consistently and transferred to the responsible laboratory in a manner that maintains sample integrity.

If necessary for waste characterization purposes, homogeneous waste streams will be sampled and analyzed for the toxicity characteristic (TC) contaminants listed in 20.4.1 NMAC § 261.24 [10-1-03]. Analysis for total concentration of TC contaminants may be performed on samples in a screening step, as described in Section 1.2 of Method 1311 (TCLP). If total concentrations are used in the waste characterization process, analytical data will be compared to the TC regulatory levels expressed as total values. These total values will be considered the regulatory threshold limit (RTL) values for the determination of whether a particular waste exhibits a TC. RTL values are obtained by calculating the weight/weight concentration (in the solid) of a TC contaminant that would give the regulatory weight/volume concentration in the TCLP extract. If the total concentrations are less

than the RTL value, the waste does not exhibit the toxicity characteristic and the TCLP does not need to be completed for the screened TC contaminants.

B.3.1.2.2 Liquid Waste Analysis

Liquid wastes generated at LANL consist of aqueous solutions, slurries, and organic liquids. If necessary for waste characterization purposes, these wastes will be sampled and analyzed for total metal content, VOCs, and SVOCs. In accordance with Method 1311 (TCLP), liquid wastes (i.e., those wastes that contain less than 0.5 percent dry solids) do not require extraction. The liquid waste, after filtration, is defined as the TCLP extract. Liquid waste, therefore, is characterized by filtering the waste, measuring total contaminant concentrations in the resulting filtrate, and comparing these concentrations to the TC regulatory levels in 20.4.1 NMAC § 261.24 [10-01-03].

Wastes that contain both a liquid and a solid phase are characterized using total analytical data for the solid phase to determine toxicity characteristics. This is accomplished by comparison with the TC regulatory levels for each phase in a manner consistent with the discussion in Section B.3.1.2.1. The following formula (EPA, 1994b) will be used to calculate the maximum theoretical leachate concentrations for the combined phases:

$$\frac{[A \times B] + [C \times D]}{B + [20 \text{ liters/kilogram} \times D]} = M$$

Where,

A = concentration of the analyte in the liquid portion of the sample (milligrams/liter)
B = volume of the liquid portion of the sample (liter)
C = concentration of the analyte in the solid portion of the sample (milligrams/kilogram)
D = weight of the solid portion of the sample (kilogram)
M = maximum theoretical leachate concentration (milligrams/liter).

B.3.1.2.3 Sample Handling, Preservation, and Storage

Table B-10 presents requirements specified in the most recent version of *SW-846* regarding sample containers, preservation techniques, and holding times associated with sample collection. Adherence to these requirements will ensure that sampling and analysis meet quality objectives for data. In the event the specified criteria are not met, another sample will be collected and submitted for analysis.

B.3.1.2.4 Analytical Laboratory Selection and Analytical Methods [20.4.1 NMAC § 264.13(b)(2)]

Analytical laboratories at LANL and/or approved subcontractor laboratories will perform the detailed qualitative and quantitative chemical analyses specified in Tables B-11 and B-12 of this WAP. These laboratories must have:

- A documented comprehensive quality assurance (QA)/quality control (QC) program
- Technical analytical expertise
- A document control/records management plan
- The capability to perform data reduction, validation, and reporting.

The selection and development of analytical testing methods for LANL waste streams were based on the following considerations:

- The physical form of the waste
- Analytes of interest
- Required detection limits (e.g., regulatory thresholds)
- Information requirements (e.g., verify compliance with LDR treatment standards, waste classification).

Collectively, these factors contributed to the selection of the analytical methods specified in Tables B-11 and B-12. Qualified analytical laboratories at LANL and/or approved subcontractor laboratories that meet the above criteria will be used for the required analyses.

B.3.1.3 Verification Frequencies [20.4.1 NMAC §§ 264.13(a)(3) and 264.13(b)(4)]

In the event that the TA-52 TRUWF accepts hazardous waste or MLLW from other waste management units at LANL, a verification program will be implemented. The verification program

will follow the program currently implemented at TA-54 as described below.

The waste verification process at TA-54 applies to waste received at the facility and designated for storage and/or off-site treatment and/or disposal. Personnel involved in verification activities are trained and qualified for the activities they perform.

Waste may be identified as part of the verification program at TA-54 through any of the following:

- Random selection, with a bias toward AK waste streams,
- Past performance of the waste generators, including previous non-conformances, and
- Incomplete or suspect documentation.

Once the waste stream has been designated for verification, waste verification personnel are notified of its pending arrival at the unit. Waste streams needing verification are sampled in accordance with approved EPA and ASTM protocols. Verification frequencies vary by the types of waste received at the facility. Some waste streams may only require a visual verification of the container's contents.

If the characterization for the waste stream is found to be inconsistent with the documentation, a non-conformance report (NCR) is issued. The NCR program is used both to trigger further verification of waste and as enforceable criteria for TA-54 waste verification program. Depending on the severity of the discrepancy, the waste generator or waste-generating facility may be subject to increased verification review under the program, and the waste may not be accepted for management at TA-54.

B.3.2 Mixed Transuranic Waste Characterization

MTRUW characterization and certification for disposal in WIPP is performed by the Centralized Characterization Project (CCP), which is under contract with the U.S. DOE Carlsbad Field Office (CBFO) to perform TRU waste characterization and certification services at many sites throughout the DOE complex. The interfaces between LANL and CCP are described in the most recent revision of the CCP/LANL Interface Document (CCP, 2006a). LANL is responsible for safely storing MTRUW, providing areas where CCP equipment can be set up and operated, providing waste that can be certified for disposal in WIPP, and repackaging any waste that cannot be certified for disposal in WIPP. CCP provides the equipment, personnel, procedures, and training to characterize MTRUW, certify that waste for disposal, and transport that waste to WIPP. The following

summarizes the requirements for characterizing and certifying waste for disposal, as presented in the most recent revision of the "CCP Transuranic Waste Characterization Quality Assurance Project Plan" (CCP 2007a). MTRUW not destined for WIPP is characterized as described in Section B.3.2.2 of this WAP.

Initial characterization of both homogeneous and heterogeneous MTRUW is based primarily on AK. Additional characterization to meet WIPP certification procedures will be implemented at appropriate LANL or other facilities to meet requirements of the WIPP WAP permit conditions. Pursuant to WIPP certification and WIPP WAP requirements, further characterization of homogeneous waste will be accomplished through AK, statistically-based sampling and analysis, headspace gas sampling, RTR, and visual examination. Further characterization of heterogeneous waste will be implemented at appropriate LANL or other facilities using AK, headspace gas sampling, RTR, and visual examination. MTRUW not destined for WIPP but stored at LANL is characterized using the routine procedures used for hazardous waste and MLLW, as discussed in Section B.3.2.2.

The MTRUW streams described in Section B.1.2.3 are categorized by Summary Category Groups based on the physical and chemical form of the waste. Homogeneous waste streams in the solid process residue (Summary Category Group S3000), soil/gravel (Summary Category Group S4000), or aqueous liquids/slurries (Summary Category Group L1000) categories may contain RCRA-regulated VOCs, SVOCs, and metals and will be characterized using AK and/or sampling and analysis. Debris waste streams (Summary Category Group S5000) consist of heterogeneous materials and, as such, it is difficult to obtain representative samples of these wastes. Therefore, debris waste will be characterized for the presence of hazardous components using AK based on examination of the original materials and operations from which the waste was generated, followed by RTR, visual examination, and headspace gas sampling.

MTRUW destined for storage at the TRUWF container storage units must meet the following WAC for free liquids: 1) no more than two liters of liquid in a 55-gallon drum; 2) no more than eight liters of liquid in a standard waste box; 3) no more than one inch of liquid in the bottom of any container; and 4) internal containers must be well drained and only contain residual liquids. Compliance with this requirement is verified through RTR or visual examination.

The QAPjP referenced above addresses MTRUW characterization procedures to be utilized after the waste is stored at LANL. These procedures were developed primarily to meet the off-site WAC. CCP's use of these procedures is designed to allow appropriate waste characterization information obtained for storage to serve as a basis for or to supplement future characterization needs without a duplication of effort. Because the QAPjP and other WIPP permit-derived documents addressing MTRUW characterization are subject to change as new information is provided, developed, or approved, and because LANL is not subject to their requirements in LANL's operating permit for storage, but rather utilizes them as waste management guidelines, this WAP will not be modified as ongoing changes to the referenced documents occur.

CCP has prepared a records inventory and disposition schedule for all waste characterization data and related QA/QC records for MTRUW to be shipped to WIPP. These documents will be designated as Lifetime Records or Non-Permanent Records as defined by the schedule and Table B-6 of the WIPP permit. Lifetime Records will be maintained for the life of the LANL MTRUW characterization program plus six years and then offered to WIPP or the appropriate Federal Records Center for permanent archival. Non-Permanent Records will be maintained for 10 years after the date of record generation and then disposed of according to the schedule.

B.3.2.1 CCP TRU Waste Certification Plan

The most recent revision of the CCP TRU Waste Certification Plan (CCP, 2007b) incorporates the certification requirements of the "Waste Acceptance Criteria for the Waste Isolation Pilot Plant" (WIPP WAC) (DOE, 2002 or most recent version) for MTRUW that will be sent to that site. It establishes the programmatic framework and requirements within which waste generators operate to ensure that their wastes can be certified as meeting the sampling, characterization, and packaging requirements of the WIPP WAC. These include CCP documents and procedures by which the waste stream analytical data and other AK information are evaluated. Once this documentation has been prepared, it is subject to review and approval by CCP and CBFO personnel. Waste generators also participate in external audits, as required by the QAPjP and the CCP TRU Waste Certification Plan, to verify the characterization and certification process. If the requirements of the WIPP WAC and the "CCP Transuranic Authorized Methods for Payload Control" (CCP, 2006b) are met, the waste will be certified and transported to WIPP.

B.3.2.1.1 Acceptable Knowledge

AK characterization procedures for MTRUW stored at LANL prior to certification for WIPP acceptance are the same as those described in Section B.3.1.1. The CCP QAPjP (CCP, 2007a) describes how CCP ensures compliance with the WIPP requirements associated with the compilation, confirmation, and administrative controls of AK information. CCP procedures consistent with the WIPP WAP are used to implement AK as part of the waste certification program for WIPP to ensure the AK information is compiled in an auditable record, the facility and MTRUW management operations are described and correlated to specific waste stream information, prohibited wastes are identified and segregated, discrepancies in AK are resolved, and the appropriate EPA Hazardous Waste Numbers are assigned.

B.3.2.1.2 Real-Time Radiography [20.4.1 NMAC § 264.13(b)(2), and 20.4.1 NMAC § 270.14(b)(2)]

RTR is a nondestructive, qualitative, and semi quantitative assay technique that involves x-ray scanning of waste containers to identify and verify, using appropriate equipment and qualified operators, the physical form(s) of waste container contents. RTR will be used to verify the absence of free liquids and prohibited items and that the physical form requirements of the WIPP WAC are met. At the same time, RTR will verify the waste classification (i.e., Summary Category Group) and waste form determined using AK. All MTRUW containers will be analyzed by RTR or Visual Examination, and the results for each waste container will be documented. An RTR data form will be used to document the types and quantities of material types observed in each container.

A radiography system routinely 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. Operating parameters such as the intensity of the x-ray can be varied for optimum viewing of the interior of the waste container. The imaging system typically utilizes an image intensifier, television camera, and remotely-located television screen. Instrument configurations will vary depending on manufacturer and site usage.

During operation of the system, the waste container is scanned while the operator views and permanently records the image from the television screen on audio/videotape. The radiography data form is also used to document the materials present and other information about the containerized waste, as required by the WIPP permit.

The radiography image produced is examined for evidence of liquid materials by jogging the container or repetitively moving the container-handling system and searching for evidence of wave motion in addition to observing the container contents for suspect waste items. The container contents are also observed for items that confirm the waste classification of the container. Conditions that limit or interfere with this determination are noted.

Operator training and experience are important considerations for assuring the quality of the radiography data. Only properly trained personnel are allowed to operate radiography equipment. Standardized training requirements for radiography operators are based upon existing industry standard training requirements. Radiography operators receive formal and on-the-job training in project requirements, system operations and standards, safe operating practices, application techniques, specific waste-generating practices, packaging configurations, parameter estimation, and identification of prohibited items. Operators must be trained and tested before they are qualified for RTR operation, and must requalify at least every two years. CCP operating and training requirements for RTR analysis of MTRUW are based on Attachment B1, "Waste Characterization Sampling Methods," Section B1-3, "Radiography" (NMED, 2002 or most recent version).

B.3.2.1.3 Visual Examination [20.4.1 NMAC § 264.13(b)(2), and 20.4.1 NMAC §270.14(b)(2)]

The contents of select MTRUW containers may be visually examined in lieu of RTR. Visual examination will also verify aspects of AK amenable to visual confirmation. For example, the visual examination will verify the physical characteristics of a waste and the associated Summary Category Group (i.e., Summary Category Group S3000, S4000, or S5000). In addition, visual examination will verify the presence of certain hazardous constituents, such as lead in lead bricks or lead-lined gloves. These types of visual confirmations will either verify or refute the overall AK used to characterize the waste stream.

The contents of each container undergoing visual examination will be provided on a visual examination data form. Visual examination procedure operators receive formal and on-the-job training in project requirements, safe operating practices, specific waste-generating practices, packaging configurations, waste parameter estimation, and identification of prohibited items. Operators must be trained and qualify for visual examination procedures and must requalify at least every two years. CCP operating and training requirements for visual examination of MTRUW are

based on Attachment B1, "Waste Characterization Sampling Methods," Section B1-3b(3), "Visual Examination" (NMED, 2002 or most recent version).

B.3.2.1.4 Headspace Gas Sampling [20.4.1 NMAC §§ 264.13(b)(2) and (3), and 20.4.1 NMAC § 270.14(b)(2)]

Headspace gas sampling and analysis is a qualitative screening technique used to confirm the presence of certain regulated hazardous constituents. This method of characterization includes representative sampling and analysis of headspace gas from the container headspace of randomly selected MTRUW containers. This data will be used to resolve the assignment of Hazardous Waste codes and to verify AK characterization data. Headspace gas sampling will not be relied upon to prove the absence of a hazardous constituent in a waste.

The precision, accuracy, and representativeness of headspace gas samples will be evaluated for adherence to the QAPjP QA objectives through analysis of field QC samples and adherence to QC practices. Sampling and analysis methods for the determination of VOCs in the headspace of MTRUW containers must meet the requirements in the WIPP WAP.

B.3.2.1.5 Solid Waste Sampling and Analysis

MTRUW homogenous solid wastes are not currently sampled or analyzed at LANL except for waste treated at the TA-55 cementation unit as described in the most recent version of the LANL General Part B (LANL, 2003). This characterization activity for other MTRUW is performed at an off-site facility under the CCP program. If at a future date sampling and/or analytical operations are to be implemented at LANL, these operations will be conducted under the CCP program with approved CCP procedures.

B.3.2.2 Non-WIPP Mixed TRU Waste Characterization

MTRUW may be generated, re-characterized, or accepted at LANL that is not currently destined for characterization and shipment to WIPP and subject to the WIPP certification requirements. Examples of this type of waste stream are MTRUW that is not generated by defense programs and items that are not compliant with the WIPP WAC.

Characterization procedures for these types of wastes will consist of the same procedures as those

described for hazardous waste and MLLW in Section B.3.1 of this plan. These wastes will be characterized using AK and/or sampling and analysis on the same basis as discussed in Section B.3.1.1. AK for these wastes can also include additional AK verification procedures for MTRUW, as discussed in Section B.3.2.1, depending on the waste type.

Characteristic MTRUW that is not currently destined for disposition at WIPP will be required to complete characterization for underlying hazardous constituents (UHC) as discussed in Section B.5.3.

B.4 OFF-SITE WASTE ACCEPTANCE PROCEDURES [20.4.1 NMAC §§ 264.13(a)(3)(II) AND (a)(4); 264.13(b)(5); AND 264.13(c)]

This section discusses general waste acceptance procedures that will be used when hazardous or mixed waste is accepted from off-site waste-generating facilities. These procedures will be used to meet the requirements of 20.4.1 NMAC §§ 264.13(a)(3)(ii), 264.13(a)(4), 264.13(b)(5), and 264.13(c) [10-01-03]. Specific descriptions of the waste streams to be received by LANL from these facilities and the appropriate waste characterization documentation and acceptance procedures are included in LANL's permit renewal documentation. The basis for characterization of waste streams to be accepted by LANL is generator documentation of the waste. For off-site waste, all of LANL's routine waste characterization documentation will, at a minimum, be collected from the generator and reviewed for completeness and accuracy by LANL in accordance with standard procedures. Off-site preshipment inspection of the waste will be used to examine the waste and its documentation, if the information provided by the generator is insufficient to meet LANLWAC.

Uniform Hazardous Waste Manifests and LDR Notification Forms, as applicable, will be prepared for each shipment of off-site hazardous or mixed waste to LANL and verified by LANL waste management personnel. Upon receipt at LANL, waste shipments will be physically examined for correct documentation, presence and correctness/completeness of waste container identification and labeling, and conformance with LANL container types and waste compatibility for storage and segregation, as appropriate. If discrepancies are found, nonconformance procedures will be followed to resolve the discrepancy. Acceptable options for resolution will include shipment of the waste back to the off-site generation facility, or temporary storage pending further analysis or characterization.

If LANL accepts hazardous waste from an off-site facility, each shipment is inspected and analyzed as necessary to determine that it matches the waste identified on the waste manifest. These requirements are reiterated under LDR.

Additional waste characterization activities in support of WIPP certification will generally be the purpose of MTRUW shipments to LANL from off site, and discrepancies may become apparent as part of characterization, as described in Section B.3.2. Resolution of such discrepancies will be performed in accordance with the procedures contained in each analytical method in conformance with the WIPP permit.

B.5 SPECIAL PROCEDURAL REQUIREMENTS [20.4.1 NMAC § 264.13(b)(6)]

Waste management requirements specific to ignitable, reactive, and incompatible waste, as well as for compliance with LDR and Subpart CC regulations, are described below. Although not required for the MTRUW predominately to be managed at the TRUWF, these may apply for segregated waste items or waste streams managed in the future.

B.5.1 Procedures for Ignitable, Reactive, and Incompatible Wastes to be Stored

Pursuant to 20.4.1 NMAC § 264.17 [10-01-03], specific waste management procedures for ignitable, reactive, and incompatible wastes to be stored are described as follows. These waste management methods vary depending on the physical form and type of waste managed. To ensure that these wastes are managed safely and properly, their characteristics are identified and documented as described in Section B.3, they are labeled appropriately, and the waste types are physically segregated within each container storage unit. Wastes are segregated and stored, as appropriate, by their physical characteristics (i.e., liquids or solids) and according to the following compatibility groups: (1) flammables/ignitables; (2) oxidizers; (3) corrosive acids; (4) reactive with water; (5) corrosive bases; (6) other reactives; and (7) other wastes.

B.5.2 Procedures to Ensure Compliance with LDR Requirements [20.4.1 §§ 268.7(a) and 268.7(b)(3), (4), and (5)]

The LDR contained in 20.4.1 NMAC, Subpart VIII, Part 268, identify hazardous wastes restricted from land disposal; define those circumstances under which an otherwise prohibited waste may continue to be placed on or in a land treatment, storage, or disposal unit; specify treatment

standards; and describe testing, tracking, and recordkeeping requirements for generators and TSDFs. This section describes the approach used by LANL treatment and storage facilities to comply with LDR requirements.

The characterization documentation for all waste streams to be treated or stored on-site are reviewed as described in Section B.3. The documentation is evaluated:

- To ensure that appropriate EPA Hazardous Waste Numbers and UHCs exceeding treatment standards are identified and that the wastes are accompanied by generator notifications/certifications, if required by 20.4.1 NMAC § 268.7(a).
- To determine whether the waste is exempt or excluded, already meets the treatment standards, or must be treated on site, off site, or both to meet all treatment standards.
- To identify the appropriate TSDF to which the waste will next be sent.

LANL maintains the waste characterization data and other records, as specified in Section B.3.

If waste is to be treated on site to meet the LDR requirements, the treatment unit must comply with the testing and reporting requirements of 20.4.1 NMAC § 268.7(b). After treating the waste, the treated waste/residue is evaluated to determine whether all treatment standards have been met. The treatment standards are defined in 20.4.1 NMAC §§ 268.40, 268.45, 268.48, or 268.49, depending on the type of waste treated. Residues from wastes with concentration-based treatment standards are analyzed by the appropriate methods described in Section B.3.1.2 to assure that the waste meets applicable treatment standards. For wastes or contaminated soil with treatment standards expressed by the waste extract, the TCLP procedures described in Sections B.3.1.2.1 or B.3.1.2.2 will be used.

The treatment facility prepares the certifications appropriate to excluded debris treated to 20.4.1 NMAC § 268.45 alternative standards, soil treated to 20.4.1 NMAC § 268.49 standards, characteristic wastes for which all characteristics have been treated and all Universal Treatment Standards have been met, characteristic wastes for which all characteristics have been treated but not all treatment standards are achieved, and/or other special certifications required for materials such as soil. New waste characterization documentation, incorporating the treatment facility paperwork requirements of 20.4.1 NMAC § 268.7(b) or the generator paperwork requirements of 20.4.1 NMAC § 268.7(a) if the residue is considered a newly-generated waste or is being shipped

to another TSDF, is prepared for the treated waste/residue, as appropriate. The certifications/notifications and waste characterization documentation are used to determine where the waste will be sent for further treatment, storage, or disposal. The appropriate 20.4.1 NMAC § 268.7(a) notifications are prepared before sending any waste subject to LDR to an off-site TSDF. Most receiving facilities have their own WAC requirements, specifying how the LDR information will be submitted. The receiving facilities usually require that analytical data be provided before the waste is shipped to ensure the waste meets their WAC. Waste may be sent to TA-54 or other LANL storage units after treatment or directly off-site from the treatment facility.

For wastes received from off-site, LANL will require an LDR notification that addresses all LDR requirements applicable to the specific waste type. If off-site wastes are treated at LANL, LANL will comply with the requirements of 20.4.1 NMAC §268.7(b), as discussed above.

As a permitted storage facility, LANL must comply with the 20.4.1 NMAC, Subpart VIII, Part 268, Subpart E, prohibitions on storage. Generally, wastes subject to LDR can be stored no longer than one year. However, the LDR provide relief from the storage prohibition for wastes that have received a variance or waiver from treatment or have no practical disposal alternative. Other rulemaking may also exempt waste from LDR. For example, MTRUW destined for WIPP is not be subject to LDR under the Federal Facilities Compliance Order (FFCO) and the WIPP Land Withdrawal Act. The 1992 Federal Facility Compliance Act (Pub.L. 102-386, 106 Stat. 1505) exempts LANL's mixed waste from the storage prohibitions under 20.4.1 NMAC, Subpart VIII, Part 268, so long as LANL is in compliance with a state-issued order and Site Treatment Plan (STP). NMED issued LANL an FFCO and approved an STP setting forth schedules for LDR compliance. LANL is in compliance with its FFCO and STP and, therefore, the storage prohibition under 20.4.1 NMAC, Subpart VIII, Part 268, does not apply to mixed waste covered by the FFCO.

B.5.3 Procedures to Ensure Compliance with Subpart CC Requirements [40 CFR § 264.1082]
LANL waste streams described in this document may be subject to 40 CFR, Part 264, Subpart CC, "Air Emission Standards for Tanks, Surface Impoundments, and Containers," based on applicability criteria specified in 20.4.1 NMAC § 264.1080. For waste units that are not exempt from this Subpart under 20.4.1 NMAC §264.1080(b), LANL will address the applicable Subpart CC requirements. In addition, the exemption from standards specified in 20.4.1 NMAC §§264.1084

through 264.1087 can be demonstrated is the average VOC concentration is less than 500 parts per million by weight (ppmw) at the point of waste origination as described in 20.4.1 NMAC § 264.1083 (a) and 264.1082(c)(1). This determination shall be reviewed and updated as necessary at least every twelve months.

The characterization documentation will be reviewed prior to acceptance of the waste at a permitted container storage unit, as discussed in Section B.3.Characterization requirements for waste that has been treated to meet the exemptions allowed at 20.4.1 NMAC §§264.1082(c)(2) and (4) are summarized below. Details for specific treatment criteria and analytical requirements associated with each exemption can be found at the regulations cited.

- In accordance with 20.4.1 NMAC § 264.1082(c)(2)(i), waste is treated to reduce the volatile organic (VO) concentration to less than 500 ppmw that is measured in either a waste from a single point of origination or individual wastes from multiple points of origination commingled before treatment. The waste shall be analyzed prior to and after treatment pursuant to provisions at 20.4.1 NMAC 264.1083(b).
- In accordance with 20.4.1 NMAC § 264.1082(c)(2)(ii), waste is treated to reduce the VO concentrations by at least 95% and the treated waste VO concentration is ensured to be less than 100 ppmw. The waste shall be analyzed prior to and after treatment pursuant to provisions at 20.4.1 NMAC § 264.1083(b).
- In accordance with 20.4.1 NMAC § 264.1082(c)(2)(iii), waste is treated to remove VO mass greater than or equal to the VO mass that exceeded the 500 ppmw. The waste shall be analyzed prior to and after treatment pursuant to provisions at 20.4.1 NMAC § 264.1083(b).
- In accordance with 20.4.1 NMAC § 264.1082(c)(2)(v), waste is treated to reduce the VO concentration to less than the lowest VO concentration for all individual waste streams mixed together at the point of origin and less than 500 ppmw. The waste must be analyzed prior to and after treatment pursuant to provisions at 20.4.1 NMAC § 264.1083(a) and (b).
- In accordance with 20.4.1 NMAC § 264.1082(c)(2)(vi), waste is treated to reduce the VO concentration by 95% and each individual waste stream entering the treatment process is certified to be less than 10,000 ppmw. The waste shall be analyzed prior to and after treatment pursuant to provisions at 20.4.1 NMAC 264.1083(a) and (b).
- In accordance with 20.4.1 NMAC § 264.1082(c)(4), waste is treated to meet LDR standards, either concentration-based or technology-based. LDR compliance is determined for concentration-based using either analysis or AK.

B.6 REFERENCES

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NMED, 2002 and all approved updates, Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit, NM 4890139088, November 26, 1999, as revised.

NMED, 1995, "Federal Facility Compliance Order (Los Alamos National Laboratory)," New Mexico Environment Department, Santa Fe, New Mexico.

Table B-1

Regulatory References and Corresponding Waste Analysis Plan Location

Regulatory Citation(s)	Description of Requirement	Location in the Waste Analysis Plan
§264.13	General waste analysis	Throughout document
§264.13(a)(1)	A detailed chemical and physical analysis of a representative sample of the waste prior to treatment, storage, or disposal of the waste	B.2, B.3
§264.13(a)(2)	Analysis may include data developed under Part 261 and existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes	B.3.1, B.3.2, B.3.3
§264.13(a)(3)	Analysis must be repeated as necessary to ensure that it is accurate and up to date	B.3.1, B.3.2, B.3.3
§264.13(a)(3)(i)	Analysis repeated when owner/operator has reason to believe that the process or operation generating the hazardous wastes, or nonhazardous wastes if applicable under § 264.113(d), has changed	B.3.1, B.3.2, B.3.3
§264.13(a)(3)(ii)	For off-site facilities, analysis repeated when the results of the inspection required in § 264.13(a)(4) indicate that the hazardous waste received at the facility does not match the waste designated on the accompanying manifest or shipping paper	B.4
§264.13(a)(4)	Owner/operator of an off-site facility must inspect and, if necessary, analyze each hazardous waste received to determine whether it matches the identity of the waste specified on the accompanying manifest or shipping paper	B.4
§264.13(b)	Development and implementation of waste analysis plan	Entire document
§264.13(b)(1)	Parameters for which each hazardous waste, or non-hazardous waste if applicable under § 264.113(d), will be analyzed and the rationale for selection of the parameters	B.2, Tables B-7, B-8, and B-9
§264.13(b)(2)	Test methods which will be used for the proposed parameters	B.3, Tables B-11, and B-12
§264.13(b)(3)	Sampling method which will be used to obtain a representative sample of the waste to be analyzed	B.3
§264.13(b)(3)(i)	Sampling methods described in Appendix I of Part 261	B.3.1, B.3.2, B.3.3
§264.13(b)(3)(ii)	An equivalent sampling method	B.3.1, B.3.2, B.3.3
§264.13(b)(4)	Frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and up to date	B.3.1, B.3.2, B.3.3

Table B-1 (Continued)

Regulatory References and Corresponding Waste Analysis Plan Location

Regulatory Citation(s)	Description of Requirement	Location in the Waste Analysis Plan
§264.13(b)(5)	For off-site facilities, the waste analyses that hazardous waste generators have agreed to supply	B.4
§264.13(b)(6)	Where applicable, the methods to meet additional waste analysis requirements for specific waste management methods as specified in § 264.17 (ignitable, reactive, or incompatible), § 264.314 (bulk and containerized liquids), § 264.341 (waste analysis for incinerators), § 264.1034(d) (Subpart AA), § 264.1063(d) (Subpart BB), § 264.1083 (Subpart CC), and § 268.7 (Land Disposal Restrictions)	B.5
§264.13(b)(7)	The procedures and schedules for surface impoundments exempted from land disposal restrictions under § 268.4(a)	NA
§264.13(b)(7)(i)	Sampling of impoundment contents	NA
§264.13(b)(7)(ii)	Analysis of test data	NA
§264.13(b)(7)(iii)	Annual removal of residues which are not delisted under § 260.22 or which exhibit a characteristic of hazardous waste and either:	NA
§264.13(b)(7)(iii)(A)	Do not meet applicable treatment standards of Part 268, Subpart D; or	NA
§264.13(b)(7)(iii)(B)	Where no treatment standards have been established;	NA
§264.13(b)(7)(iii)(B)(1)	Such residues are prohibited from land disposal under § 268.32 or the Resource Conservation and Recovery Act § 3004(d); or	NA
§264.13(b)(7)(iii)(B)(2)	Such residues are prohibited from land disposal under § 268.33(f)	NA
§264.13(b)(8)	For owner/operator seeking an exemption to the air emission standards of Subpart CC in accordance with § 264.1082	B.5.4
§264.13(b)(8)(i)	If direct measurement is used for the waste determination, the procedures and schedules for waste sampling and analysis and the results of the analysis of test data to verify the exemption	B.5.4
§264.13(b)(8)(ii)	If knowledge of the waste is used for the waste determination, any information prepared by the facility owner/operator or by the generator of the hazardous waste if the waste is received from off-site, that is used as the basis for knowledge of the waste	B.5.4
§264.13(c)	For off-site facilities, the procedures which will be used to inspect and, if necessary, analyze each movement of hazardous waste received at the facility to ensure that it matches the identity of the waste designated on the accompanying manifest or shipping paper	B.4

Table B-1 (Continued)

Regulatory References and Corresponding Waste Analysis Plan Location

Regulatory Citation(s)	Description of Requirement	Location in the Waste Analysis Plan
§264.13(c)(1)	The procedures to determine the identity of each movement of waste managed at the facility	B.4
§264.13(c)(2)	The sampling method which will be used to obtain a representative sample of the waste to be identified, if the identification method includes sampling	B.4
§264.13(c)(3)	The procedures for an off-site landfill receiving containerized hazardous wastes to determine whether a hazardous waste generator or treater has added a biodegradable sorbent to the waste in the container	NA

[a] NA = not applicable

Table B-2
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Spent Solvents	Research and development (R&D) activities; laser research; organic and inorganic chemistry research (e.g., solvent extractions, liquid chromatography solvents, polymer synthesis, and distillations); cleaning; and degreasing operations	Acceptable Knowledge[d] Sampling and Analysis	D001	Ignitability	NA[e]	Acetone, Acetonitrile, Antimony, Benzene, Cadmium, Cyanides (Total), 1,2-Dichloroethane, 1,4-Dioxane, Ethyl ether, Methanol, Methylene chloride, Toluene, Trichloroethylene, Triethylamine
			D002	Corrosivity	NA[e]	
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D026	Cresol	200.0[h]	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D029	1,1-Dichloroethylene	0.7	
			D030	2,4-Dinitrotoluene	0.13	
			D032	Hexachlorobenzene	0.13	
			D034	Hexachloroethane	3.0	
			D035	Methyl ethyl ketone	200.0	
			D036	Nitrobenzene	2.0	
			D037	Pentrachlorophenol	100.0	
			D038	Pyridine	5.0	
			D040	Trichloroethylene	0.5	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
			D043	Vinyl chloride	0.2	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F004	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	
			U213	Tetrahydrofuran	NA[e]	

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Contaminated Solid Wastes	Machining operations, chemistry research, decontamination and decommissioning projects, metal finishing operations, HE wastewater filtration, and general maintenance operations	Acceptable Knowledge[d] Sampling and Analysis	D001	Ignitability	NA[e]	Barium, Beryllium, Cadmium, Carbon disulfide, Chloroform, Chromium (Total), Ethel ether, Lead, Mercury-all others, Methanol, Methyl ethyl ketone, Methylene chloride, Nickel, Phenol, p,p'-DDT, Selenium, Silver, Thallium, Trichloroethylene
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D023	o-Cresol	200.0[h]	
			D024	m-Cresol	200.0[h]	
			D025	p-Cresol	200.0[h]	
			D026	Cresol	200.0[h]	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D029	1,1-Dichloroethylene	0.7	
			D030	2,4-Dinitrotoluene	0.13	
			D031	Heptachlor (and its epoxide)	0.008	
			D032	Hexachlorobenzene	0.13	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D035	Methyl ethyl ketone	200.0	
			D036	Nitrobenzene	2.0	
			D037	Pentrachlorophenol	100.0	
			D038	Pyridine	5.0[f]	
			D039	Tetrachloroethylene	0.7	
			D040	Trichloroethylene	0.5	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
			D043	Vinyl chloride	0.2	
			F001	Spent halogented solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F004	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	
			K045	Spent carbon	NA[e]	

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Paint and Related Wastes	Painting and finishing operations, and general facility maintenance	Acceptable Knowledge[d] Sampling and Analysis	D001 D005 D006 D007 D008 D009 D011 D036 F003 F005	Ignitability Barium Cadmium Chromium Lead Mercury Silver Nitrobenzene Spent non-halogenated solvents Spent non-halogenated solvents	NA[e] 100.0 1.0 5.0 5.0 0.2 5.0 2.0 NA[e] NA[e]	Lead, Methyl ethyl ketone
Photographic and Photocopier Wastes	Photographic film processing and photocopier operations	Acceptable Knowledge[d] Sampling and Analysis	D001 D002 D006 D007 D008 D011	Ignitability Corrosivity Cadmium Chromium Lead Silver	NA[e] NA[e] 1.0 5.0 5.0 5.0	Silver

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Corrosive Liquid Wastes	Analytical chemistry research, electro-etching, and electro-polishing	Acceptable Knowledge[d] Sampling and Analysis	D001 D002 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D022 D038 F002 F003 F005 P023	Ignitability Corrosivity Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Chloroform Pyridine Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents Chloroacetaldehyde	NA[e] NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 6.0 5.0 NA[e] NA[e] NA[e] NA[e]	Acetone, Arsenic, Barium, Cadmium, Chromium (Total), Cyanides (Total), 2,4-Dinitrophenol, Fluoride, Isobutyl alcohol, Lead, Mercury-all others, Methanol, Nickel, o-Nitrophenol, Selenium, Silver, Sulfide, Thallium, Triethylamine, Zinc
Solid Metals and Metallic Compounds	Machining and cutting operations; synthesis reactions; solder from electronic manufacturing, repair, and brazing operations; and grinding operations	Acceptable Knowledge[d] Sampling and Analysis	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0	Arsenic, Lead, Nickel, Silver

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges	Vacuum pump maintenance, analytical spectrometry, equipment cleaning and maintenance, vehicle maintenance, synthesis reactions, metal-polishing operations, and chemical research	Acceptable Knowledge[d] Sampling and Analysis	D001	Ignitability	NA[e]	Acetone, Acetonitrile, Antimony, Arsenic, Barium, Benzene, Cadmium, Carbon tetrachloride, Chromium (Total), Chrysene, p-Cresol, m-Dichlorobenzene, 1,2-Dichloroethane, 4,6-Dinitro-o-cresol, 1,4-Dioxane, Fluorene, Indeno(1,2,3-c,d) pyrene, Lead, Mercury-all others, Methanol, Methyl ethyl ketone, Methylene chloride, Naphthalene, p-Nitrophenol, Pyridine, Selenium, Silver, Tetrachloroethylene, Toluene, Trichloroethylene, 2,4,6-Trichlorophenol, Zinc
			D002	Corrosivity	NA[e]	
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D023	o-Cresol	200.0[h]	
			D024	m-Cresol	200.0[h]	
			D025	p-Cresol	200.0[h]	
			D026	Cresol	200.0[h]	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D029	1,1-Dichloroethylene	0.7	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D035	Methyl ethyl ketone	200.0	
			D036	Nitrobenzene	2.0	
			D037	Pentrachlorophenol	100.0	
			D038	Pyridine	5.0	
			D039	Tetrachloroethylene	0.7	
			D040	Trichloroethylene	0.5	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
			D043	Vinyl chloride	0.2	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F004	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Mercury Wastes	Lamp replacement, chemical research, mercury spill cleanup, and equipment cleaning and maintenance	Acceptable Knowledge[d] Sampling and Analysis	D003 D008 D009 D011 U151	Reactivity Lead Mercury Silver Mercury	NA[e] 5.0 0.2 5.0 NA[e]	Barium, Chromium (Total), Mercury-all others, Thallium, Zinc
Used Batteries and Battery Fluids	Equipment maintenance	Acceptable Knowledge[d]	D002 D003 D006 D007 D008 D009 D011 D038	Corrosivity Reactivity Cadmium Chromium Lead Mercury Silver Pyridine	NA[e] NA[e] 1.0 5.0 5.0 0.2 5.0 5.0[f]	Cadmium, Lead, Pyridine, Silver
Unused/Off-specification Commercial Chemical Products	R&D, spill residues, and general facility operations	Acceptable Knowledge[d] Sampling and Analysis	D001 D002 D003 D004 through D043 All P- and U-listed EPA Hazardous Waste Numbers[g]	Ignitability Corrosivity Reactivity Toxicity characteristic wastes Discarded commercial chemical products and off-specification species	NA[e] NA[e] NA[e] -[c] NA[e]	Acetonitrile, Barium, Cadmium, Chromium (Total), Lead, Mercury-all others, Nickel, Selenium, Silver, Toluene

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Gas Cylinder Waste	R&D and general facility operations	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	
			D002	Corrosivity	NA[e]	
			D003	Reactivity	NA[e]	
			Potential D-coded EPA Hazardous Waste Numbers	Toxicity characteristic wastes	-[c]	
			Potential P-and U-listed EPA Hazardous Waste Numbers[g]	Discarded commercial chemical products and off-specification species	NA[e]	
Corrective Action Soils and Sludges	Site decommissioning, site characterization, and site remediation; includes septic tank and detention basin closure, removal actions, and other remedial actions and site closures	Acceptable Knowledge[d] Sampling and Analysis	D001	Ignitability	NA[e]	Barium, Cadmium, Lead
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D022	Chloroform	6.0	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D036	Nitrobenzene	2.0	
			D039	Tetrachloroethylene	0.7	
			D040	Trichloroethylene	0.5	
			D042	2,4,6-Trichlorophenol	2.0	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Corrective Action Aqueous Liquids	Decontamination of remedial equipment, drilling fluids and well development fluids, septic tank liquids, and contaminated storm water runoff	Acceptable Knowledge[d] Sampling and Analysis	D001 D002 D004 D005 D006 D007 D008 D009 D010 D011 D038 F002 F003 F005	Ignitability Corrosivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Pyridine Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 5.0 NA[e] NA[e] NA[e]	
Corrective Action Debris	Site decommissioning, site characterization, and site remediation; includes septic tank and detention basin closure, removal actions, and other remedial actions and site closures	Acceptable Knowledge[d]	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D022 D030 D032 D033 D034 D036 D039 D040 D042	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Chloroform 2,4-Dinitrotoluene Hexachlorobenzene Hexachlorobutadiene Hexachloroethane Nitrobenzene Tetrachloroethylene Trichloroethylene 2,4,6-Trichlorophenol	NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 6.0 0.13[f] 0.13[f] 0.5 3.0 2.0 0.7 0.5 2.0	Barium, Lead

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Corrective Action Debris (continued)			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

a Denotes information from the Los Alamos National Laboratory waste characterization documentation database.
b U.S. Environmental Protection Agency.
c A solid waste exhibits the characteristics of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed (D004-D043) at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart II, Part 261, Subpart C [6-14-00].
d Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994. "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.
e Not applicable: Refers to the absence of regulatory limits for ignitable, corrosive, and reactive characteristic wastes and F-, P-, and U-listed wastes.
f The quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level (20.4.1 NMAC, Subpart II, 261.24, Table 1) [6-14-00].
g Refers to the P- and U-listed wastes found in the "Los Alamos National Laboratory General Part A Permit Application," Revision 3.0, 2002, Los Alamos National Laboratory, Los Alamos, New Mexico.
h If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 milligrams per liter.

Note: Fluoride, sulfide, vanadium, and zinc are not "underlying hazardous constituents" in characteristic wastes, according to the definition in § 268.2(i). Selenium is not an underlying hazardous constituent as defined at § 268.2(i) because its Universal Treatment Standard level is greater than its Toxicity Characteristic level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

Table B-3

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Solid Wastes						
Soils with Heavy Metals	Decontamination and decommissioning (D&D) and Corrective Action activities	Acceptable Knowledge[d] and Preliminary Analysis[e]	D004 D005 D006 D007 D008 D009 D010 D011	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0	Arsenic, Barium, Chromium (Total), Mercury-all others, Selenium, Vanadium, Zinc
Environmental Restoration Soils	Remediation of release sites and D&D activities	Acceptable Knowledge[d] Sampling and Analysis	D005 D006 D007 D008 D009 D028 D029 F001 F002 F004 F005	Barium Cadmium Chromium Lead Mercury 1,2-Dichloroethane 1,1-Dichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	100.0 1.0 5.0 5.0 0.2 0.5 0.7 NA[e] NA[e] NA[e] NA[e]	Chromium (Total), Lead
Inorganic Solid Oxidizers	D&D of research laboratories and research and development (R&D)	Acceptable Knowledge[d]	D001 D003 D005	Ignitability Reactivity Barium	NA[e] NA[e] 100.0	
Lead Waste	Radioisotope experiments and other reactor, accelerator, laser, and x-ray activities	Acceptable Knowledge[d]	D002 D003 D007 D008 D009	Corrosivity Reactivity Chromium Lead Mercury	NA[e] NA[e] 5.0 5.0 0.2	Lead
Noncombustible Debris	Maintenance, D&D, R&D, and corrective action activities	Acceptable Knowledge[d]	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 F002 F005	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Spent halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 NA[e] NA[e]	Arsenic, Cadmium, Chromium (Total), Lead, Mercury-all others

See footnotes at end of table.

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Solid Wastes (Continued)						
Combustible Debris	Maintenance, R&D, D&D, and corrective action activities	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	Lead, Mercury-all others, Nickel, Zinc
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	
Organic-Contaminated Noncombustible Solids	Vacuum pump maintenance, R&D, D&D, and corrective action activities	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	Methoxychlor, Methyl ethyl ketone
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D027	1,4-Dichlorobenzene	7.5	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D035	Methyl ethyl ketone	200.0	
			D037	Pentrachlorophenol	100.0	
			D038	Pyridine	5.0[f]	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F004	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

See footnotes at end of table.

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Solid Wastes (Continued)						
Organic-Contaminated Combustible Solids	Maintenance, D&D, and corrective action activities	Acceptable Knowledge[d]	D001 D003 D007 D008 D009 D030 D035 F001 F002 F003 F005	Ignitability Reactivity Chromium Lead Mercury 2,4-Dinitrotoluene Methyl ethyl ketone Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 5.0 0.2 0.13[f] 200.0 NA[e] NA[e] NA[e] NA[e]	
Water-Reactive Wastes	Cleanup of HE firing-site debris, machining and disassembly of test components	Acceptable Knowledge[d]	D001 D003 D005 F002	Ignitability Reactivity Barium Spent halogenated solvents	NA[e] NA[e] 100.0 NA[e]	
Mercury Wastes	Cleanup operations	Acceptable Knowledge[d]	D005 D007 D008 D009 F001	Barium Chromium Lead Mercury Spent halogenated solvents	100.0 5.0 5.0 0.2 NA[e]	Mercury-all others
Unused Solid Reagent Chemical Wastes	R&D activities	Acceptable Knowledge[d]	D001 D002 D003 All P- and U-listed EPA Hazardous Waste Numbers[h]	Ignitability Corrosivity Reactivity Discarded commercial chemical products and off-specification species	NA[e] NA[e] NA[e] NA[e]	

See footnotes at end of table.

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Liquid Wastes						
Spent Solvents and Contaminated Solvent Mixtures	Maintenance, cleaning, and degreasing activities: R&D; processing operations, such as extraction, bench-scale experimental inorganic chemistry, environmental analysis, radiochemistry	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	Tribromomethane (Bromoform)
			D002	Corrosivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D036	Nitrobenzene	2.0	
			D042	2,4,6-Trichlorophenol	2.0	
			D043	Vinyl chloride	0.2	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

See footnotes at end of table.

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Liquid Wastes (Continued)						
Corrosive Liquid Wastes	Radiochemistry research, plutonium-processing operations, and analytical chemistry	Acceptable Knowledge[d]	D001 D002 D004 D006 D007 D008 D009 D010 D011 D036 D043 F001 F002 F005	Ignitability Corrosivity Arsenic Cadmium Chromium Lead Mercury Selenium Silver Nitrobenzene Vinyl chloride Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 1.0 5.0 5.0 0.2 1.0 5.0 2.0 0.2 NA[e] NA[e] NA[e]	Arsenic, Barium, Bromodichloromethane, Chromium (Total), Lead, Nickel, Silver
Aqueous and Nonaqueous Liquids Contaminated with Heavy Metals and/or Organics	corrective action activities, metal-polishing operations, and radiochemistry research	Acceptable Knowledge[d] Sampling and Analysis[i]	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D023 D024 F002 F005	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform o-Cresol m-Cresol Spent halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0[g] 200.0[g] NA[e] NA[e]	Chromium (Total), 1,2-Dichloroethane, Selenium

See footnotes at end of table.

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Liquid Wastes (Continued)						
Oil Wastes	Equipment maintenance operations	Acceptable Knowledge[d]	D004 D005 D006 D007 D008 D009 D010 D018 D019 D027 D028 D030 D032 D033 D034 D036 D037 D038 D041 D042 D043 F001 F002 F003 F005	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Benzene Carbon tetrachloride 1,4-Dichlorobenzene 1,2-Dichloroethane 2,4-Dinitrotoluene Hexachlorobenzene Hexachlorobutadiene Hexachloroethane Nitrobenzene Pentrachlorophenol Pyridine 2,4,5-Trichlorophenol 2,4,6-Trichlorophenol Vinyl chloride Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	5.0 100.0 1.0 5.0 5.0 0.2 1.0 0.5 0.5 7.5 0.5 0.13[f] 0.13[f] 0.5 3.0 2.0 100.0 5.0[f] 400.0 2.0 0.2 NA[e] NA[e] NA[e] NA[e]	Diethylphthalate, Di-n-butyl phthalate, Hexachlorobenzene, Hexachlorocyclopentadiene, Nitrobenzene, Thallium, 2,4,5-Trichlorophenol, Silver
Unused Liquid Reagent Chemical Wastes	R&D activities	Acceptable Knowledge[d]	D001 D002 D035 All P- and U-listed EPA Hazardous Waste Numbers[h]	Ignitability Corrosivity Methyl ethyl ketone Discarded commercial chemical products and off-specification species	NA[e] NA[e] 200.0 NA[e]	

See footnotes at end of table.

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Gas Cylinder Waste						
Gas Cylinder Waste	R&D and general facility operations	Acceptable Knowledge[d]	D001 D002 D003 Potential D-coded EPA Hazardous Waste Numbers	Ignitability Corrosivity Reactivity Toxicity characteristic wastes	NA[e] NA[e] NA[e] -[c]	
			Potential P- and U-listed EPA Hazardous Waste Numbers[i]	Discarded commercial chemical products and off-specification species	NA[e]	

[a] Denotes information from the Los Alamos National Laboratory waste characterization documentation database.
[b] U.S. Environmental Protection Agency.
[c] A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed (D004-D043) at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart II, Part 261, Subpart C [6-14-00].
[d] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.
[e] Not applicable: Refers to the absence of regulatory limits for ignitable, corrosive, and reactive characteristic wastes and F-, P-, and U-listed wastes.
[f] The quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level (20.4.1 NMAC, Subpart II, 261.24, Table 1 [6-14-00]).
[g] If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 milligrams per liter.
[h] Refers to the P- and U-listed wastes found in the "Los Alamos National Laboratory General Part A Permit Application," Revision 3.0, 2002, Los Alamos National Laboratory, Los Alamos, New Mexico.

Note: Fluoride, sulfide, vanadium, and zinc are not "underlying hazardous constituents" in characteristic wastes, according to the definition in § 268.2(i). Selenium is not an underlying hazardous constituent as defined at § 268.2(i) because its Universal Treatment Standard level is greater than its Toxicity Characteristic level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

Table B-4

LANL MTRUW Stream Waste Matrix Codes Correlated with LANL Waste Identification Systems

Summary Category Group	Waste Matrix Code	Waste Stream Description	RSWD Code[a]	IDC[b]	TRUCON Code[c]
S3000 - Homogeneous	S3100	Homogeneous Inorganic, Cemented	A-25 Leached Process Residues A-26 Evaporator Bottoms/Salts A-76 Cement Paste	002 Cemented Aqueous Waste 006 Solidified Inorganic and Organic Process Solids	LA111 Solidified Aqueous or Homogeneous Inorganic Solids LA114 Solidified Inorganic Process Solids
	S3100	Homogeneous Inorganic, Cemented Organics			LA126 Solidified Organic Process Solids
	S3100	Homogeneous Inorganic, Non-cemented	A-75 Chemical Treatment Sludge	003 Stabilized Aqueous Waste (dewatered sludge)	LA122 Solid Inorganic Waste LA130 Ash
	S3100	Homogeneous Inorganic, Salts	A-27 Nitrate Salts A-28 Chloride Salts A-29 Hydroxide Cake	Salt Waste	LA124 Pyrochemical Salt Waste
	S3100	Homogeneous Inorganic, Vermiculite	A-20 Hydrocarbon Oil – Liquid (Absorbed) A-21 Silicon-Based - Liquid (Absorbed)		LA112 Solidified Organic Waste
S4000 – Soil/Gravel	S4100	Soil	A-90 Radioactively-Contaminated Soil		

See footnotes at end of table.

Table B-4 (Continued)

LANL MTRUW Stream Waste Matrix Codes Correlated with LANL Waste Identification Systems

Summary Category Group	Waste Matrix Code	Waste Stream Description	RSWD Code[a]		IDC[b]		TRUCON Code[c]	
S5000 - Debris	S5300	Combustible Debris	A-14	Combustible Decon Waste	004	Combustible Waste	LA116	Combustible Debris
			A-15	Cellulosics				
			A-16	Plastics				
			A-17	Rubber Materials				
			A-18	Combustible Lab Trash				
			A-35	Combustible Building Debris				
			A-40	Combustible Hot-Cell Waste				
			A-60	Other Combustibles				
	S5400	Heterogeneous Debris	A-10	Graphite Solids	001	Metal Scrap and Incidental Combustibles	LA115	Graphite Waste
			A-19	Combined Combustible/Non-Combustible Lab Trash	005	Combined Noncombustible / Combustible Waste	LA117	Metal Waste
			A-30	PN Equipment	005LG	Glass Waste	LA118	Glass Waste
			A-31	Non-PN Equipment	005LM	Metal Waste	LA119	HEPA Filter Waste
			A-36	Noncombustible Building Debris	005P1	Leaded Rubber and Metal Waste	LA123	Leaded Rubber and Metal Waste

See footnotes at end of table.

Table B-4 (Continued)

LANL MTRUW Stream Waste Matrix Codes Correlated with LANL Waste Identification Systems

Summary Category Group	Waste Matrix Code	Waste Stream Description	RSWD Code[a]	IDC[b]	TRUCON Code[c]
			A-41 Noncombustible Hot-Cell Waste A-46 Skull and Oxide A-47 Slag and Porcelain A-50 Metal Crucibles, Scrap, Dies A-51 Precious Metals A-52 Scrap Metal A-55 Filter Media A-56 Filter Media Residue A-61 Other Noncombustibles A-72 Beryllium Contaminated Debris A-74 Ion Exchange Resin A-80 Irradiation Sources A-85 Firing Point Residues A-95 Glass	005P2G Graphite Waste	LA125 Mixed Combustible / Noncombustible Waste

[a] RSWD = Radioactive Solid Waste Disposal [codes]

[b] IDC = Item Description Code

[c] TRUCON = TRUPACT-II Content [codes]

Table B-5

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

Summary Category Group	Waste Matrix Code	Waste Stream Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents[f]
S3000 - Homogeneous	S3100	Homogeneous Inorganic, Cemented	Plutonium processing operations	Acceptable Knowledge[d]	D002 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D035 D038 D039 D040 F001 F002 F003 F005	Corrosive Reactive Arsenic Barium hydroxide Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform Methyl ethyl ketone Pyridine Tetrachloroethylene Trichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0 5.0[g] 0.7 0.5 NA[e] NA[e] NA[e] NA[e]	
		Homogeneous Inorganic, Cemented Organics	Plutonium processing operations	Acceptable Knowledge[d]				
		Homogeneous Inorganic, Non-cemented	Plutonium processing operations	Acceptable Knowledge[d]				
		Homogeneous Inorganic, Salts	Plutonium processing operations	Acceptable Knowledge[d]				

See footnotes at end of table.

Table B-5 (Continued)

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

Summary Category Group	Waste Matrix Code	Waste Stream Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents[f]
S3000 - Homogeneous	S3100	Homogeneous Inorganic, Vermiculite	Plutonium processing operations	Acceptable Knowledge[d]	D002	Corrosive	NA[e]	
					D004	Arsenic	5.0	
					D005	Barium hydroxide	100.0	
					D006	Cadmium	1.0	
					D007	Chromium	5.0	
					D008	Lead	5.0	
					D009	Mercury	0.2	
					D010	Selenium	1.0	
					D011	Silver	5.0	
					D018	Benzene	0.5	
					D019	Carbon tetrachloride	0.5	
					D021	Chlorobenzene	100.0	
					D022	Chloroform	6.0	
					D027	1,4-Dichlorobenzene	7.5	
					D028	1,2-Dichloroethane	0.5	
					D030	2,4-Dinitrotoluene	0.13[g]	
					D032	Hexachlorobenzene	0.13[g]	
					D033	Hexachlorobutadiene	0.5	
					D034	Hexachloroethane	3.0	
					D035	Methyl ethyl ketone	200.0	
					D036	Nitrobenzene	2.0	
					D037	Pentachlorophenol	100.0	
					D038	Pyridine	5.0[g]	
					D039	Tetrachloroethylene	0.7	
					D040	Trichloroethylene	0.5	
					D042	2,4,6-Trichlorophenol	2.0	
					D043	Vinyl Chloride	0.2	
					F001	Spent halogenated solvents	NA[e]	
					F002	Spent halogenated solvents	NA[e]	
					F003	Spent non-halogenated solvents	NA[e]	
					F005	Spent non-halogenated solvents	NA[e]	

See footnotes at end of table.

Table B-5 (Continued)

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

Summary Category Group	Waste Matrix Code	Waste Stream Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents[f]
S4000 – Soil/ Gravel	S4100	Soil	D&D	Acceptable Knowledge[d]	D004	Arsenic	5.0	D004
					D005	Barium hydroxide	100.0	D005
					D006	Cadmium	1.0	D006
					D007	Chromium	5.0	D007
					D008	Lead	5.0	D008
					D009	Mercury	0.2	D009
					D010	Selenium	1.0	D010
					D011	Silver	5.0	D011
					D018	Benzene	0.5	D018
					D019	Carbon tetrachloride	0.5	D019
					D021	Chlorobenzene	100.0	D021
					D022	Chloroform	6.0	D022
					D035	Methyl ethyl ketone	200.0	D035
					D038	Pyridine	5.0[g]	D038
					D039	Tetrachloroethylene	0.7	D039
					D040	Trichloroethylene	0.5	D040
					F001	Spent halogenated solvents	NA[e]	F001
					F002	Spent halogenated solvents	NA[e]	F002
					F003	Spent non-halogenated solvents	NA[e]	F003
					F005	Spent non-halogenated solvents	NA[e]	F005

See footnotes at end of table.

Table B-5 (Continued)

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

Summary Category Group	Waste Matrix Code	Waste Stream Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents[f]
S5000 - Debris	S5300	Combustible Debris	Plutonium processing operations	Acceptable Knowledge[d]	D003	Reactive	NA[e]	
					D004	Arsenic	5.0	
					D005	Barium hydroxide	100.0	
	S5400	Heterogeneous Debris	Plutonium processing operations; D&D	Acceptable Knowledge[d]	D006	Cadmium	1.0	
					D007	Chromium	5.0	
					D008	Lead	5.0	
					D009	Mercury	0.2	
					D010	Selenium	1.0	
					D011	Silver	5.0	
					D018	Benzene	0.5	
					D019	Carbon tetrachloride	0.5	
					D021	Chlorobenzene	100.0	
					D022	Chloroform	6.0	
					D035	Methyl ethyl ketone	200.0	
					D038	Pyridine	5.0[g]	
					D039	Tetrachloroethylene	0.7	
					D040	Trichloroethylene	0.5	
					D043	Vinyl Chloride	0.2	
					F001	Spent halogenated solvents	NA[e]	
					F002	Spent halogenated solvents	NA[e]	
					F003	Spent non-halogenated solvents	NA[e]	
					F004	Spent non-halogenated solvents	NA[e]	
					F005	Spent non-halogenated solvents	NA[e]	
					U080	Methylene Chloride	NA[e]	

See footnotes at end of table.

Table B-5 (Continued)

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

[a] This table is based on information from the *Acceptable Knowledge Information Summary for Los Alamos National Laboratory Transuranic Waste Streams* (AKIS), (TWCP-AK-2.1-019, R.0) (LA-UR-03-4870); and from waste characterization documentation information maintained by the Facility and Waste Operations Division. Waste with EPA Hazardous Waste Numbers that are not included in the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit will not be transported to WIPP.

[b] U.S. Environmental Protection Agency.

[c] A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, Part 261, Subpart C [6-14-00].

[d] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

[e] Not Applicable.

[f] Potential underlying hazardous constituents (UHC) have been included, where the information is available. UHC characterization for the purpose of Land Disposal Restrictions will not apply for mixed transuranic waste to be disposed of at WIPP.

[g] Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.

Note: Fluoride, sulfide, vanadium, and zinc are not "underlying hazardous constituents" in characteristic wastes, according to the definition in § 268.2(i). Selenium is not an underlying hazardous constituent as defined at § 268.2(i) because its Universal Treatment Standard level is greater than its Toxicity Characteristic level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

Table B-6

Descriptions of Waste Generated at Off-Site Facilities That May Be Received at LANL

Off-Site Waste Generating Facility	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste
Sandia National Laboratories/New Mexico, Albuquerque, NM	Potential mixed transuranic waste: Combustible and noncombustible debris including metals, cellulosics, rubber, plastics, organic matrices, and inorganic materials.	To be determined	To be determined	To be determined	To be determined

Table B-7

Parameters, Characterization Methods, and Rationale for Parameter Selection for Hazardous Waste

Waste Description[a]	Parameters[b]	Characterization Methods	Rationale
Spent Solvents	– Flash point (for liquid waste) – pH (for liquid waste) – RCRA[c]-regulated metals – Volatile organic compounds (VOC) – Semivolatile organic compounds (SVOC)	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, reactivity, and toxicity – Determine concentration of F-listed solvents
Contaminated Solid Wastes	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, reactivity, and toxicity – Determine concentration of F-listed solvents
Paint and Related Wastes	– Flash point (for liquid waste) – RCRA[c]-regulated metals – VOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability and toxicity – Determine concentration of F-listed solvents
Photographic and Photocopier Wastes	– Flash point (for liquid waste) – pH (for liquid waste) – RCRA[c]-regulated metals	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, and toxicity
Corrosive Liquid Wastes	– Flash point (for liquid waste) – pH (for liquid waste) – RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, and toxicity – Determine concentration of F-listed solvents
Solid Metals and Metallic Compounds	– RCRA[c]-regulated metals	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, reactivity, and toxicity
Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges	– Flash point – RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, reactivity, and toxicity – Determine concentration of F-listed solvents
Mercury Wastes	– RCRA[c]-regulated metal	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characterisitc for toxicity – Determine the presence of a U-listed unused commercial chemical product
Used Batteries and Battery Fluids	– pH (for liquid waste) – RCRA[c]-regulated metals	– Acceptable Knowledge[d]	– Determine characteristic for corrosivity and toxicity
Unused/Off-specification Commercial Chemical Products	– Flash point (for liquid waste) – pH (for liquid waste) – RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, reactivity, and toxicity – Determine presence of P-listed or U-listed unused commercial chemical products
Gas Cylinder Waste	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characterisitic for ignitability, corrosivity, and reactivity – Determine presence of D-coded and U- and P-listed wastes
Corrective Action Soils and Sludges	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability, reactivity, and toxicity – Determine concentration of F-listed solvents

Refer to footnotes at end of table.

Table B-7 (Continued)

Parameters, Characterization Methods, and Rationale for Parameter Selection for Hazardous Waste

Waste Description[a]	Parameters[b]	Characterization Methods	Rationale
Corrective Action Aqueous Liquids	– pH – RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability, corrosivity, reactivity, and toxicity – Determine concentration of F-listed solvents
Corrective Action Debris	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability, reactivity, and toxicity – Determine concentration of F-listed solvents

[a] Information contained in this column is from the Los Alamos National Laboratory waste characterization documentation database.
[b] Parameter selection is based on acceptable knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.
[c] Resource Conservation and Recovery Act. Use of the term "RCRA-regulated metals" refers to hazardous waste as defined in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, 261.24 [6-14-00].
[d] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-8

Parameters, Characterization Methods, and Rationale for Parameter Selection for Mixed Low-Level Waste

Waste Description[a]	Parameter[b]	Characterization Method	Rationale
Solid Wastes			
Soils with Heavy Metals	– RCRA-regulated metals[c]	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic
Environmental Restoration Soils	– RCRA-regulated metals[c] – Volatile organic compounds (VOC)	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine presence of F-listed solvents – Determine toxicity characteristic
Inorganic Solid Oxidizers	– RCRA-regulated metals[c]	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic – Determine characteristic for ignitability and reactivity
Lead Waste	– RCRA-regulated metals[c]	– Acceptable Knowledge[d]	– Determine characteristic for reactivity – Determine toxicity characteristic
Noncombustible Debris	– RCRA-regulated metals[c]	– Acceptable Knowledge[d]	– Determine toxicity characteristic – Determine characteristic for ignitability and reactivity
Combustible Debris	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d]	– Determine toxicity characteristic – Determine presence of F-listed solvents – Determine characteristic for ignitability and reactivity
Organic-Contaminated Noncombustible Solids	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d]	– Determine toxicity characteristic – Determine presence of F-listed solvents
Organic-Contaminated Combustible Solids	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability and reactivity – Determine toxicity characteristic – Determine presence of F-listed solvents
Water-Reactive Wastes	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic – Determine characteristic for ignitability and reactivity – Determine presence of F-listed solvents

Refer to footnotes at end of table.

Table B-8 (Continued)

Parameters, Characterization Methods, and Rationale for Parameter Selection for Mixed Low-Level Waste

Waste Description[a]	Parameter[b]	Characterization Method	Rationale
Solid Wastes (Continued)			
Mercury Wastes	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic – Determine presence of F-listed solvents
Unused Solid Reagent Chemical Wastes	– RCRA-regulated metals[c]	– Acceptable Knowledge[d]	– Determine characteristic for ignitability and corrosivity – Determine the presence of P- and U-listed unused commercial chemical product
Liquid Wastes			
Spent Solvents and Contaminated Solvent Mixtures	– Flash point – pH – RCRA-regulated metals[c] – VOCs – Semivolatile organic compounds (SVOC)	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, and toxicity – Determine concentration of F-listed solvents
Corrosive Liquid Wastes	– Flash point – pH – RCRA-regulated metals[c] – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, and toxicity – Determine concentration of F-listed solvents
Aqueous and Nonaqueous Liquids Contaminated with Heavy Metals and/or Organics	– Flash point – RCRA-regulated metals[c] – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability and toxicity – Determine concentration of F-listed solvents
Oil Wastes	– RCRA-regulated metals[c] – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and analysis	– Determine characteristic for toxicity – Determine concentration of F-listed solvents
Unused Liquid Reagent Chemical Wastes	– Flash point – pH	– Acceptable Knowledge[d]	– Determine characteristic for ignitability and corrosivity – Determine the presence of P- and U-listed unused commercial chemical product
Gas Wastes			
Gas Cylinder Waste	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability, corrosivity, and reactivity – Determine presence of D-coded and P- and U-listed waste

[a] Information contained in this column is extracted primarily from Los Alamos National Laboratory, 1995, "LANL's Federal Facility Compliance Order Site Treatment Plan Background Volume," Los Alamos National Laboratory, Los Alamos, New Mexico.

[b] Parameter selection is based on acceptable knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.

[c] Resource Conservation and Recovery Act. Use of the term "RCRA-regulated metals" refers to hazardous waste as defined in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, 261.24 [6-14-00].

[d] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-9

Parameters, Characterization Methods, and Rationale for Parameter Selection for Mixed Transuranic Waste

Summary Category Group/Description[a]	Waste Description	Parameters	Characterization Methods	Rationale
Storage				
S3000-Homogeneous Solids	– Solidified aqueous waste (e.g., concreted/cemented aqueous waste)	– Free liquids in waste matrix – Physical form of the waste	– Visual examination – Real-time radiography (RTR) – Acceptable Knowledge[b]	– Verify physical waste form – No free liquids allowed
	– Solidified aqueous waste (e.g., dewatered sludge and chemical treatment sludge) – Solidified inorganic/organic process solids and liquids	– Resource Conservation and Recovery Act (RCRA)-regulated metals	– Sample and analyze statistically selected number of drums in waste stream – Acceptable Knowledge[b]	– Determine toxicity characteristic – Determine concentration of metals
	– Homogeneous inorganic solids – Glass/noncombustible waste – Uncemented inorganics – Absorbed organics on vermiculite	– Volatile organic compounds (VOC) in container headspace gas	– Gas chromatography / mass spectrometry (GC/MS) – Fourier transform infrared spectrometry – Gas chromatography / Flame ionization detector – Acceptable Knowledge[b]	Qualitative screening to confirm the presence of VOCs
S4000-Soils/Gravels	– Contaminated soil	– Free liquids in waste matrix – Physical form of the waste	– Visual examination – RTR – Acceptable Knowledge[b]	– Verify physical waste form – No free liquids allowed
		– RCRA-regulated metals	– Sample and analyze statistically selected number of drums in waste stream – Acceptable Knowledge[b]	– Determine toxicity characteristic – Determine concentration of metals
		– VOCs in container headspace gas	– GC/MS – Fourier transform infrared spectrometry – Gas chromatography / Flame ionization detector	Qualitative screening to confirm the presence of VOCs

Refer to footnotes at end of table.

Table B-9 (Continued)

Parameters, Characterization Methods, and Rationale for Parameter Selection for Mixed Transuranic Waste

Summary Category Group/Description [a]	Waste Description	Parameters	Characterization Methods	Rationale
Storage (continued)				
S5000-Debris Waste	– Mixed metal scrap and incidental combustibles – Combustible waste – Graphite waste – Metal waste – Glass waste	– Free liquids – Physical form of the waste – VOCs in container headspace gas – VOCs and semivolatile organic compounds	– Visual examination – RTR – Acceptable Knowledge[b]	– Verify physical waste form – No free liquids allowed – Determine compliance with land disposal restrictions (LDR) treatment standards, if applicable
	– Leaded-rubber and metal waste – High-efficiency particulate air filters – Noncombustible waste – Mixed combustible / noncombustible waste	– RCRA-regulated metals	– Gas chromatography / mass spectrometry – Fourier transform infrared spectrometry – Gas chromatography / Flame ionization detector – Acceptable Knowledge[b]	– Qualitative screening to confirm the presence of VOC – Determine compliance with LDR treatment standards, if applicable
Treatment				
L1000–Aqueous Liquids/Slurries	Evaporator bottoms solutions, aqueous waste, and laboratory solutions	– RCRA-regulated metals and corrosivity	– Acceptable Knowledge[b] – Sampling and Analysis	– Determine toxicity characteristics – Determine concentration of metals
S3000-Homogeneous Solids	Inorganic process solids and cemented inorganic process solids	– RCRA-regulated metals	– Acceptable Knowledge[b] – Sampling and Analysis	– Determine concentration of metals

[a] Information in this column is based on information from the *Acceptable Knowledge Information Summary for Los Alamos National Laboratory Transuranic Waste Streams* (AKIS), TWCP-AK-2.1-019, R.0, LA-UR-03-4870, Los Alamos National Laboratory, Los Alamos, New Mexico.

[b] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-10

Recommended Sample Containers[a], Preservation Techniques, and Holding Times[b]

Analyte Class and Sample Type	Container	Preservative	Holding Time
Volatile Organics			
Concentrated Waste Samples:	Method 5035: 40-milliliter (mL) vials with stirring bar. Method 5021: See method. Methods 5031 & 5032: 125-mL WM[c]-G[d]. Use Teflon-lined lids for all procedures.	Cool to 4º degrees Celsius (ºC)[e]	14 days
Aqueous Samples:			
No Residual Chlorine Present	Methods 5030, 5031, & 5032: 2 x 40-mL vials with Teflon-lined septum caps.	Cool to 4ºC and adjust pH[f] to less than 2 with H_2SO_4, HCl, or solid $NaHSO_4$	14 days
Residual Chlorine Present	Methods 5030, 5031, & 5032: 2 x 40-mL vials with Teflon-lined septum caps.	Collect sample in a 125-mL container which has been pre-preserved with 4 drops of 10% sodium thiosulfate solution. Gently swirl to mix sample and transfer to a 40-mL volatile organic analysis (VOA) vial. Cool to 4ºC and adjust pH to less than 2 with H_2SO_4, HCl, or solid $NaHSO_4$	14 days
Acrolein and Acrylonitrile	Methods 5030, 5031, & 5032: 2 x 40-mL vials with Teflon-lined septum caps.	Adjust to pH of 4-5. Cool to 4ºC	14 days
Soil/Sediments and Sludges:	Method 5035: 40-mL vials with stirring bar. Method 5021: See method. Methods 5031 & 5032: 125-mL WM[c]-G[d]. Use Teflon-lined lids for all procedures.	See the individual method	14 days

Refer to footnotes at end of table.

Table B-10 (Continued)

Recommended Sample Containers[a], Preservation Techniques, and Holding Times[b]

Analyte Class and Sample Type	Container	Preservative	Holding Time
Semivolatile Organics/Organochlorine Pesticides and Herbicides			
Concentrated Waste Samples:	125 mL WM[c]-G[d] with Teflon-lined lid	None	Samples must be extracted within 14 days and analyzed within 40 days following extraction.
Soil/Sediments and Sludges:	250 mL WM[c]-G[d] with Teflon-lined lid	Cool to 4ºC	Samples must be extracted within 14 days and analyzed within 40 days following extraction.
Liquid Samples:			
No Residual Chlorine Present	1-gallon (gal.), 2 x 0.5 gal., or 4 x 1 liter (L) AG[g] container with Teflon[9]-lined lid	Cool to 4ºC	Samples must be extracted within 7 days and extracts analyzed within 40 days following extraction
Residual Chlorine Present	1-gal., 2 x 0.5 gal., or 4 x 1-L AG[g] with Teflon[9]-lined lid	Add 3-mL 10% sodium thiosulfate solution per gallon (or 0.008%). Addition of sodium thiosulfate solution to sample container may be performed in the laboratory prior to field use. Cool to 4ºC.	Samples must be extracted within 7 days and extracts analyzed within 40 days following extraction
Metals			
Aqueous Samples:			
Metals (except hexavalent chromium and mercury)	1-L P[h] or G[d]	Add nitric acid to adjust pH to less than 2.	180 days
Hexavalent chromium	500-mL P[h] or G[d]	Cool to 4ºC	24 hours
Mercury	500-mL P[h] or G[d]	Add nitric acid to adjust pH to less than 2.	28 days
Soil/Sediments and Sludges:			
Metals (except hexavalent chromium and mercury)	500-mL WM[c]-P[h] or G[d]	Cool to 4ºC	180 days
Hexavalent chromium	500-mL WM[c]-P[h] or G[d]	Cool to 4ºC	Not established - analyze as soon as possible.
Mercury	500-mL WM[c]-P[h] or G[d]	Cool to 4ºC	28 days

Refer to footnotes at end of table.

Table B-10 (Continued)

Recommended Sample Containers[a], Preservation Techniques, and Holding Times[b]

[a] Smaller sample containers may be required due to health and safety concerns associated with potential radiation exposure, transportation requirements, and waste management considerations.
[b] Information primarily from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846,* U.S. Environmental Protection Agency, 1986 and all approved updates.
[c] WM = Wide-mouth
[d] G - Glass
[e] Adjust to pH of less than 2 with sulfuric acid, hydrochloric acid, or solid sodium bisulfate.
[f] A term used to describe the hydrogen-ion activity of a system.
[g] AG = Amber glass
[h] P = Polyethylene

Table B-11

Summary of Characterization Methods for Hazardous Waste

Parameter	Method Numbers	Test Methods	Rationale
Volatile organic compounds (VOC) in waste matrix: Spent halogenated solvents Spent nonhalogenated Solvents	ASTM Method D4547-91[a] U.S. EPA/540/4-91/001[b] SW-846 (1311, 8260B, 8275A)[c] or equivalent methods[d] Methods included in 20.4.1 NMAC §§ 265.1084(a)(2), (a)(3), and (a)(4)	Total and/or toxicity characteristic leaching procedure (TCLP) VOC analysis by gas chromotography/mass spectrometry (GC/MS) Semivolatile organic compound (SVOC) analysis by thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS) Acceptable Knowledge[f]	Determine total and/or TCLP and SVOC/VOC concentration in samples of solids or liquids
SVOCs in waste:	SW-846 (1311 and 8270C)[c] or equivalent methods[d]	Total or TCLP SVOC analysis by GC/MS Acceptable Knowledge[f]	Determine total and/or TCLP and SVOC concentration in samples of solids or liquids
Resource Conservation and Recovery Act-regulated metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A, 7061A)[c] (1311, 6010B, 7080A, 7081)[c] (1311, 6010B, 7130, 7131A)[c] (1311, 6010B, 7190, 7191)[c] (1311, 6010B, 7420, 7421)[c] (1311, 6010B, 7470A, 7471A, 7472)[c] (1311, 6010B, 7740, 7741A, 7742)[c] (1311, 6010B, 7760A, 7761)[c] or equivalent methods[d]	Total and/or TCLP Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Manual cold vapor atomic absorption Anodic stripping voltammetry Acceptable Knowledge[f]	Determine total and/or TCLP concentration in samples of solids or liquids
Reactive Sulfide	SW-846, Test Method to Determine Hydrogen Sulfide Released from Wastes[e] SW-846 (9030B, 9031, 9034)[c] or equivalent methods[d]	Colorimetric, titrametric, or spectrophotometric measurement of hydrogen sulfide released from waste following reflux distillation under acidic conditions	Determine concentration of reactive sulfides

Refer to footnotes at end of table.

Table B-11 (Continued)

Summary of Characterization Methods for Hazardous Waste

Parameter	Method Numbers	Test Methods	Rationale
Ignitability (Flash Point)	SW-846 (1010, 1020A, 1030)[c] or equivalent methods[d]	Pensky-Martens closed cup Setaflash closed cup Ignitability of solids	Determine ignitablity
pH (Corrosivity)	SW-846 (9040B, 9041A, 9045C)[c] or equivalent methods[d]	pH electrometric measurement pH paper Soil and waste pH	Determine corrosivity

[a] American Society for Testing and Materials, 1991, "Standard Practice for Sampling Waste and Soils for Volatile Organic Compounds," ASTM D4547-91, *Annual Book of ASTM Standards*, Philadelphia, Pennsylvania, American Society for Testing and Materials.
[b] U.S. Environmental Protection Agency (EPA), 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91001, Office of Research and Development.
[c] U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[d] Equivalent methods subject to EPA approval may be substituted.
[e] *SW-846*, Section 7.3.4.2 contains specialized methods to determine if a sulfide-containing waste exhibits the reactivity characteristic.
[f] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-12

Summary of Characterization Methods for Mixed Low-Level Waste

Parameter	Method Numbers	Test Method	Rationale
	Solid Wastes		
Volatile organic compounds (VOC) in waste matrix: Spent halogenated solvents Spent nonhalogenated solvents	ASTM Method D4547-91[a] U.S. EPA/540/4-91/001[b] SW-846 (1311, 8260B, 8275A)[c] or equivalent methods[d] Methods included in 20.4.1 NMAC §§ 265.1084(a)(2), (a)(3), and (a)(4)	Total and/or toxicity characteristic leaching procedure (TCLP) VOC analysis by gas chromotography/mass spectrometry (GC/MS) Semivolatile organic compounds (SVOC) analysis by thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS) Acceptable Knowledge[e]	Determine total and/or TCLP and VOC concentration in samples of solid process residues and soils
SVOCs in waste:	SW-846 (1311 and 8270C)[c] or equivalent methods[d]	Total and/or TCLP SVOC analysis by GC/MS Acceptable Knowledge[e]	Determine total and/or TCLP and SVOC concentration in samples of solid process residues and soils
Resource Conservation and Recovery Act (RCRA)-regulated metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A, 7061A)[c] (1311, 6010B, 7080A, 7081)[c] (1311, 6010B, 7130, 7131A)[c] (1311, 6010B, 7190, 7191)[c] (1311, 6010B, 7420, 7421)[c] (1311, 6010B, 7470A, 7471A, 7472)[c] (1311, 6010B, 7740, 7741A, 7742)[c] (1311, 6010B, 7760A, 7761)[c] or equivalent methods[d]	Total and/or TCLP Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Manual cold vapor atomic absorption Acceptable Knowledge[e]	Determine total and/or TCLP concentration in samples of solid process residues and soils
	Liquid Wastes		
VOCs in waste matrix: Spent halogenated solvents Spent nonhalogenated solvents	ASTM Method D4547-91[a] EPA/540/4-91/001[b] SW-846 (1311 and 8260B)[c] or equivalent methods[d]	Total and/or TCLP VOC analysis by GC/MS Acceptable Knowledge[e]	Determine total and/or TCLP and VOC concentration in samples of liquid
SVOCs in waste:	SW-846 (1311 and 8270B)[c] or equivalent methods[d]	Total and/or TCLP SVOC analysis by GC/MS Acceptable Knowledge[e]	Determine total and/or TCLP and SVOC concentration in samples of liquid

Refer to footnotes at end of table.

Table B-12 (Continued)

Summary of Characterization Methods for Mixed Low-Level Waste

Parameter	Method Numbers	Test Method	Rationale
	Liquid Wastes (Continued)		
RCRA-regulated metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A, 7061A)[c] (1311, 6010B, 7080A, 7081)[c] (1311, 6010B, 7130, 7131A)[c] (1311, 6010B, 7190, 7191)[c] (1311, 6010B, 7420, 7421)[c] (1311, 6010B, 7470A, 7471A, 7472)[c] (1311, 6010B, 7740, 7741A, 7742)[c] (1311, 6010B, 7760A, 7761)[c] or equivalent methods[d]	Total and/or TCLP Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Manual cold vapor atomic absorption Anodic stripping voltammetry Acceptable Knowledge[e]	Determine total and/or TCLP concentration in samples of liquid
Ignitability (Flash Point)	SW-846 (1010, 1020A, 1030)[c] or equivalent methods[d]	Pensky-Martens closed cup Setaflash closed cup Acceptable Knowledge[e]	Determine ignitability
pH (Corrosivity)	SW-846 (9040B, 9041A, 9045C)[c] or equivalent methods[d]	pH electrometric Measurement pH paper Soil and waste pH Acceptable Knowledge[e]	Determine corrosivity

[a] American Society for Testing and Materials, 1991, "Standard Practice for Sampling Waste and Soils for Volatile Organic Compounds," ASTM D4547-91, *Annual Book of ASTM Standards*, Philadelphia, Pennsylvania, American Society for Testing and Materials.
[b] U.S. Environmental Protection Agency (EPA), 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91991, Office of Research and Development.
[c] U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[d] Equivalent methods, subject to EPA approval, may be substituted.
[e] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.