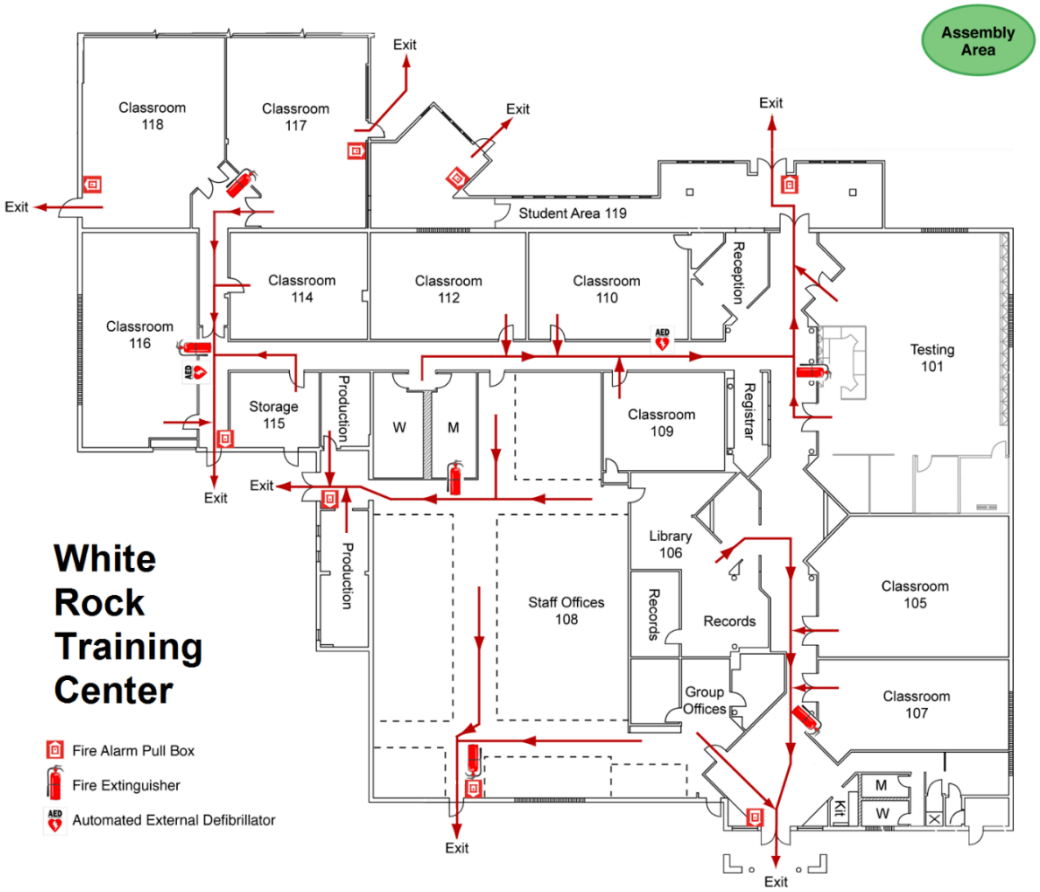
Los Alamos
NATIONAL LABORATORY

WASTE GENERATION OVERVIEW LIVE

COURSE #23263

AUGUST 2025



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WASTE GENERATION OVERVIEW LIVE

STUDENT MANUAL

Course Information

Waste Generation Overview Live Course #23263

This course provides an overview of regulations and requirements that affect waste generation at Los Alamos National Laboratory (LANL). It focuses on how to manage all waste at LANL safely, effectively, and in compliance with those regulations and requirements.

Course Overview

The primary consideration in operation of LANL's facilities is the safety of the public, workers, environment, and national security assets and to perform its operations effectively. *Waste Generation Overview Live* (Couse #23263) describes waste generator responsibilities and provides an overview of the requirements for how all types of waste and especially hazardous wastes are to be managed at LANL. It is required that all activities and operations involving the use of hazardous materials and generation of hazardous waste be managed thoughtfully and carefully.

Course Purpose

Upon successful completion of this course, participants will recognize the primary elements of waste management at LANL.

Course Objectives

After completing this course, you will be able to recognize:

- *the importance of waste management at LANL, including the regulations and requirements that affect LANL waste operations;*
- *the waste management process at LANL;*
- *roles and responsibilities of Waste Generators and Waste Management Coordinators, including the liabilities and enforcement of regulations for hazardous waste;*
- *planning, characterization, and documentation of waste;*
- *waste accumulation areas – requirements, container management; and*
- *emergency requirements for Satellite and Central Accumulation Areas, including required emergency equipment and documentation.*

Target Audience

This course and its subsequent refresher course, Waste Generation Overview Refresher, are required for all workers who generate waste (except office trash) and are assigned the training requirements below. A **waste generator** is any person (facility, owner, or operator) whose act or process produces waste or whose act first causes waste to become subject to environmental regulations (40 CFR 260.10). More detail will be given in Module 1.

Program Owner

This course was developed under the direction and technical oversight of Environment and Waste Programs (EWP), the functional program owner for this training.

Training Requirements

- *Initial training – Waste Generator Overview Live (#23263) / Waste Generation Overview Live Quiz #61067**
- *Refresher training – Waste Generator Overview Refresher (#21464) / Quiz***

*To receive credit for WGO Live, students must attend the course and take the quiz.
**To receive credit for WGO Refresher, students must complete the eLearning and quiz. Workers whose training expires are prohibited from generating waste, treating waste, or working in a waste management accumulation, staging, or storage area until their training is completed.

Course Limitations

This course does not address facility-specific and job-specific training that may be required by facilities that handle waste at LANL.

Registration and Attendance

Attendance is crucial in order to receive credit for this course. All participants must complete registration prior to the beginning of the course, sign the attendance roster for each day of the course, and attend and actively participate in the course. (No credit will be given for participants that miss 15 minutes or more of class time.)

Note – Hazardous waste workers only: Training must be provided within six months after the date of employment or assignment to a new facility or to a new position at a facility, whichever is later. Employees must not work in unsupervised positions until they have completed the training.

Delivery Methods

Course delivery consists of lecture, group discussions, and participant activities.

Evaluation Strategy

Formative assessment: The instructor will use oral questioning during the presentation of each module to assess participants' mastery of the material. Problem areas identified during questioning will be reviewed in further detail. Participants will be evaluated with classroom discussion and a participant activity.

Summative assessment: There is an accompanying quiz in UTrain, Waste Generation Overview Live Quiz #61067, on which students must achieve a score of 80% or better.

Administrative Details

Details will be given about facility safety features and any additional resources or equipment available. Participants must adhere to all safety requirements during training sessions and notify instructor of any questions or concerns about safety.

Acronyms

AK	acceptable knowledge
CAS	Chemical Abstract Service
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWDR	chemical waste disposal request
DOE	Department of Energy
DOT	Department of Transportation
EMP	Emergency Management Plan
EMS	Environmental Management System
EO-EM	Emergency Management (group)
EPC-CP	Environmental Compliance Programs
EPC-ES	Environmental Stewardship Office
EPA	Environmental Protection Agency
ER	environmental restoration
FFCA	Federal Facilities Compliance Act
GIC	Green Is Clean
HMTA	Hazardous Materials Transportation Act
HPI	human performance improvement
HSWA	Hazardous and Solid Waste Amendments
HWFP	hazardous waste facility permit
ID	identification
IRF	inspection record form
ISO	International Organization for Standardization
IWD	integrated work document
LANL	Los Alamos National Laboratory
LDR	land disposal restriction
LANS	Los Alamos National Security, LLC
LLW	low-level (radioactive) waste
LOL	List of Lists
MLLW	mixed LLW
MSS	Maintenance and Site Services
MTRU	mixed TRU
MTSCA	mixed TSCA
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMHWA	New Mexico Hazardous Waste Act
NNSA	National Nuclear Security Administration
OSHA	Occupational Safety and Health Administration
P	Policy
P2	pollution prevention

PCB	polychlorinated biphenyl
PPE	personal protective equipment
ppm	parts per million
psia	pounds per square inch absolute
psig	pounds per square inch gauge
RCA	radiologically controlled area
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RLWTF	radioactive liquid waste treatment facility
SAA	satellite accumulation area
SDS	safety data sheet
STP	standard temperature and pressure
SWS	sanitary wastewater system
SWSC	sanitary wastewater system consolidation
TA	technical area
TCE	trichloroethylene
TCLP	toxicity characteristic leaching procedure
TFCH	treated formerly characteristic hazardous
TRU	transuranic
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
TSDF	treatment, storage, and disposal facility (for offsite disposal)
TSF	treatment and storage facility
UHC	underlying hazardous constituent
UHWM	uniform hazardous waste manifest
WAC	waste acceptance criteria
WCATS	Waste Compliance and Tracking System
WCP	Waste Certification Program
WDR	waste disposal request
WMC	waste management coordinator
WM-DO	Waste Management Division Office
WSP	waste stream profile

Glossary

See LANL Definition of Terms

Term	Definition
acceptable knowledge	A waste stream characterization method that can be used to meet all or part of the waste analysis requirements appropriate for the waste media. The method may include documented process knowledge (also known as knowledge of process), additional characterization data, and/or facility records of analysis.
accumulation start date	The date on which each period of hazardous or mixed waste accumulation in a container, tank, or accumulation/storage area begins. Waste containers in the following areas require an accumulation start date: universal waste, central accumulation area (CAA), permitted hazardous waste storage unit, and satellite accumulation area (SAA) when the SAA's volume limit is exceeded.
acutely hazardous waste	Waste that has been found to be fatal to humans in low doses or, in the absence of data on human toxicity, it has been shown in studies to have an oral lethal dose (LD) 50 toxicity (rat) of less than 50 milligrams per kilogram, an inhalation lethal concentration 50 toxicity (rat) of less than 2 milligrams per liter, or a dermal LD 50 toxicity (rabbit) of less than 200 milligrams per kilogram or is otherwise capable of causing or significantly contributing to an increase in serious irreversible or incapacitating reversible illness. Waste listed in accordance with these criteria will carry a U.S. Environmental Protection Agency hazardous waste number that includes "P" or the following "F" codes: F020, F021, F022, F023, F026, and F027. (See 40 CFR 261.11(a)(2).)
administratively controlled waste	Waste that is nonhazardous and nonradioactive that may not be disposed of at a commercial or municipal solid waste landfill. This waste includes, but is not limited to, classified waste, sensitive waste, empty containers greater than 30 gallons and other types.
asbestos waste	Waste that contains more than 1% of any of the following naturally occurring crystalline minerals: chrysotile, amosite, crocidolite, tremolite, actinolite, and anthophyllite; may be friable or nonfriable.

ash	Material that results from the incineration or transformation of solid waste and includes fly ash, bottom ash, and ash from the incineration of densified-refuse-derived fuel and refuse-derived fuel. This definition does not include fly ash waste, bottom ash waste, slag waste, and flue gas emission control waste generated primarily from the combustion of coal or other fossil fuels and wastes produced in conjunction with the combustion of fossil fuels that are necessarily associated with the production of energy and that traditionally have been and actually are mixed with and are disposed of or treated at the same time with fly ash, bottom ash, boiler slag, or flue gas emission control wastes from coal combustion.
central accumulation area	A designated space for accumulating hazardous or mixed waste in containers or tanks; the waste may not remain in the accumulation area longer than 90 days. See 40 CFR 262.17.
characteristic hazardous waste	Wastes that exhibit one or more of the four categories used in defining hazardous waste: ignitability, corrosivity, reactivity, and toxicity. See 40 CFR 261, Subpart C.
characterization	The determination of a waste's physical, chemical, biological, and radiological characteristics with sufficient accuracy to permit proper segregation, treatment, storage, and disposal according to the final treatment, storage, or disposal facility's (TSDF's) waste acceptance criteria (WAC).
classified waste	Classified matter determined by a generating group to be a waste that could include documents, film, parts or assemblies, safe or vault locking devices, computer tape, degaussed magnetic tape, metal parts, or classified shapes.
commercial solid waste	Includes all types of solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential, household, and industrial wastes. These wastes may be disposed at commercial or municipal solid waste facilities.
compatibility	Waste, including secondary job waste, that can be safely mixed with other waste and materials. The resultant waste mixture will not react in a manner that produces effects harmful to human health or the environment, including heat or pressure; fire, explosions, or violent reactions; uncontrolled toxic mists; dusts; fumes; or gases in sufficient quantity to pose a risk of fire or explosions or to damage the structural integrity of the container, including the inner liner, in a manner that can cause corrosion or decay (see 40 CFR 264.17 and 264.172).

construction and demolition debris	Materials generally considered not to be water soluble and nonhazardous in nature, including glass, brick, concrete, asphalt roofing materials, pipe, gypsum wallboard, lumber, and other materials discarded during the construction or destruction of a structure or project. This debris also includes rocks, soil, tree remains, trees, and other vegetative matter that normally results from land clearing.
contingency plan	A document that describes an organized, planned, and coordinated course of action to be followed in case of a fire, explosion, or release of hazardous waste or hazardous waste constituents that could threaten human health or the environment.
container	Any device in which a material is stored, transported, treated, disposed of, or otherwise handled, as described in 40 CFR 260.10. Most containers are portable (readily movable); a permanently installed tank and similar structures are also considered containers.
corrosivity (D002)	A solid waste exhibits the characteristic of corrosivity if it is: • aqueous and has a pH of less than or equal to 2 or greater than or equal to 12.5 as determined by a pH meter using Method 9040C in "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods" (EPA Publication SW-846) or • a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by Method 1110A in SW-846.
decommissioning	The permanent removal from service of surface facilities or equipment.
decontamination	The removal of unwanted material (e.g., radioactive material) from personnel, equipment, or areas.
discharge	Spilling, leaking, pumping, pouring, emitting, emptying, or dumping into water or in a location and manner where there is a reasonable probability that the discharged substance will reach surface or subsurface water. Discharges can be accidental or intentional.
disposal	The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwater.

electronic waste (E-waste)	A term loosely applied to consumer and business electronic equipment that is near or at the end of its useful life. E-waste includes computers, computer peripherals, telephones, answering machines, radios, stereo equipment, tape players/recorders, phonographs, video cassette players/recorders, compact disc players/recorders, calculators, and some appliances. Certain components of some electronic products contain materials that render them hazardous, depending on their condition and density.
environmental restoration	A term used by the DOE to describe cleanup of DOE facilities and lands.
EPA identification number	The number assigned by the U.S. Environmental Protection Agency to each generator, transporter, and treatment, storage, and disposal facility.
hazardous waste	A solid waste that is not excluded from regulation under 40 CFR 261.4(b) and that is listed in 40 CFR 261, Subpart D; exhibits any of the characteristics identified in 40 CFR 261, Subpart C; or is a mixture of solid waste and one or more hazardous wastes listed in 40 CFR 261, Subpart D. For purposes of corrective action, hazardous waste will have the meaning set forth in the New Mexico Hazardous Waste Act (HWA), Section 74-4-3(K). Hazardous waste may be a “mixed waste,” which is waste that contains hazardous waste that is subject to the HWA and the Resource Conservation and Recovery Act and source, special nuclear, or byproduct material subject to the Atomic Energy Act, 42 U.S.C. § 2011, et seq.
hazardous waste determination	The process (identified at 40 CFR 262.11) followed to decide if a solid waste is a hazardous waste. The term can also refer to the resulting decision and the documentation created to confirm the accuracy of the hazardous waste determination.
high-explosive waste	Any waste containing material having an amount of stored chemical energy that starts a violent reaction when initiated by impact, spark, or heat. This violent reaction is accompanied by a strong shock wave and the potential for propelling high-velocity particles.
incompatible waste	A hazardous waste that is unsuitable for: • placement in a particular device or facility because it could cause corrosion or decay of containment materials (such as container inner liners or tank walls); or • commingling with another waste or material under uncontrolled conditions because the commingling might produce heat or pressure, fire or explosion, violent reaction, toxic dusts, mists, fumes or gases, or flammable fumes or gases.

industrial solid waste	Solid waste generated by manufacturing or industrial processes that is not hazardous waste regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA). This term does not include mining waste or oil and gas waste.
industrial wastewater	Water that includes radioactive waste, chemical waste, high explosives waste, and other industrial waste that is not acceptable for discharge into the sanitary wastewater system.
infectious waste	A limited class of substances that carry a probable risk of transmitting disease to humans, including but not limited to microbiological laboratory wastes, including cultures and stocks of infectious agents from clinical research and industrial laboratories and disposable culture dishes and devices used to transfer, inoculate, and mix cultures; pathological wastes, including human or animal tissues, organs, and body parts removed during surgery, autopsy, or biopsy; disposable equipment, instruments, utensils, and other disposable materials that require special precautions because of contamination by highly contagious diseases; human blood and blood products, including waste blood, blood serum, and plasma; used sharps, including used hypodermic needles, syringes, scalpel blades, Pasteur pipettes, and broken glass; and contaminated animal carcasses, body parts, and bedding, especially those intentionally exposed to pathogens in research, in the production of biologicals or the in vivo testing of pharmaceuticals.
inner liner	A continuous layer of material placed inside a tank or container that protects the construction materials of the tank or container from the contained waste or reagents used to treat the waste.
interim status unit	Any hazardous waste management unit that was in operation before the effective date of the statutory or regulatory amendments that caused the unit to become subject to permitting requirements that • meets the requirements for interim status under § 3005(e) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6925(e); • has not had its interim status terminated pursuant to Section 3005(e)(2) of RCRA, 42 U.S.C. § 6925(e)(2); and • has not been issued a permit by the Environmental Protection Agency or the New Mexico Environment Department.
land disposal	Placement of waste in or on the land (except in a corrective action management unit or staging pile), including (without limitation) placement in a landfill such as a pit or a trench, surface impoundment, waste pile, or land treatment facility; or placement in a concrete vault or a shaft intended for disposal purposes.

liquid waste	A waste material that is determined to contain free liquids defined by the paint filter test described in "Test Methods for Evaluating Solid Waste: Physical/Chemical Methods" (EPA Publication SW-846; NMAC 20.9.8.11 C.).
listed hazardous waste	Wastes that are listed in 40 CFR 261.30–261.33, mixtures of those wastes, and wastes derived from those wastes. Listed hazardous wastes are listed specifically because they are inherently ignitable, corrosive, reactive, and/or toxic.
low-level radioactive waste (LLW)	Radioactive waste that is not high-level waste, spent nuclear fuel, transuranic (TRU) waste, byproduct material, or naturally occurring radioactive material.
mixed waste	Any waste that contains hazardous waste (as defined herein) and source, special nuclear or byproduct materials subject to the Atomic Energy Act of 1954. The use of the generic term *mixed waste* will refer to both mixed low-level radioactive waste **and mixed transuranic waste**.
municipal solid waste	Household solid waste, commercial solid waste, and industrial solid waste or petroleum-contaminated soils that are not a special waste.
municipal solid waste landfill	A solid waste facility that receives household waste and may also receive commercial solid waste, industrial solid waste, and construction and demolition debris, depending on its permit.
New Mexico Special Waste (NMSW)	Solid waste that has unique handling, transportation, and/or disposal requirements to assure protection of the environment and the public health, welfare, and safety (NMAC 20.9.2.7, S. (13). At LANL, NMSW includes treated formerly characteristic hazardous wastes; regulated asbestos waste; ash; infectious waste; sludge; industrial solid waste that, unless specially handled or disposed, could harm the environment or endanger public health or safety; spill of a chemical substance or commercial product that, unless specially handled or disposed, could harm the environment or endanger public health or safety; unbound engineered nanoparticle waste; petroleum-contaminated soil that has a sum of benzene, toluene, ethylbenzene, and xylene isomer concentrations of greater than 50 mg/kg or benzene individually greater than 10 mg/kg or a total petroleum hydrocarbon concentration of greater than 100 mg/kg. NMSW does not include waste regulated by any other regulatory program; therefore, NMSW does not include hazardous waste, universal waste, used oil, radioactive waste, polychlorinated biphenyl waste, etc.
no-known-owner waste	Sometimes designated as "orphan waste"; any material or waste with an unknown origin, history, generator, or process that does not have a defined owner.
non-hazardous waste	Any waste that is not regulated as a hazardous waste by the Resource Conservation and Recovery Act.

orphan waste	See “no-known-owner waste.”
overpack	A container used by a single shipper to provide protection or convenience in handling a package or to consolidate two or more packages.
package	Packaging and its contents.
packaging	A receptacle and any other components or materials necessary for the receptacle to perform its intended containment function in conformance with the minimum packing requirements of the Department of Transportation.
PCBs (polychlorinated biphenyls)	A group of man-made organic chemicals once widely used in various industrial and commercial applications, primarily used in coolants and lubricants in transformers, capacitors, and other electrical equipment; also found use in fluorescent lighting fixtures, microscope oil, and hydraulic fluids.
PCB storage area, general	An area for the storage of polychlorinated biphenyl (PCB) waste that is not Resource Conservation and Recovery Act hazardous or radioactive. Waste may be stored up to 1 year based on the out-of-service date, which is the date PCB material was taken out of service and placed into storage.
PCB storage area, temporary	A polychlorinated biphenyl (PCB) storage area (subject to an approved spill prevention control and countermeasures compliance plan) designated for up to 30-days’ onsite storage of PCB waste.
pyrophoric material	A material that, under normal conditions, is liable to cause fires through friction or retained heat from manufacturing or processing or that can be ignited readily and when ignited burns so vigorously and persistently as to create a serious transportation, handling, or disposal hazard.
radioactive waste	Waste that has been determined to contain added radioactive material or activation products or concentrated naturally occurring radioactive material by monitoring and analysis, AK, or both, or does not meet radiological release criteria.
sanitary waste	“Municipal solid waste” generated at a private household that may be disposed at a municipal solid waste landfill. The Laboratory does not generate municipal solid waste; items normally classified as sanitary waste at home are commercial solid waste (see *commercial solid waste*) if generated at the Laboratory.
satellite accumulation area (SAA)	A designated space for accumulating hazardous and mixed waste, where the volume of hazardous waste may not exceed 55 gallons or the volume of acutely hazardous waste may not exceed 1 quart of liquid. The accumulation area must be located at or near the point of generation and be under the control of the generator/operator of the process generating the waste. See 40 CFR 262.15.

secondary containment	Any system, device, or control measure that is used to stop a discharge, spill, leak, or other release from leaving a specified area. Incompatible materials may NOT be stored on the same secondary containment.
secondary material	Miscellaneous materials associated with waste processing that are placed into primary or daughter containers during packaging/repackaging. Examples of secondary waste include gloves, tools, rags, wipes (Kimwipes), plastic labels, tags, personal protective equipment (PPE), plastic sheeting used for contamination control, and original packaging material (e.g., plastic bags, plywood sheathing, and rigid liner lids cut into pieces).
segregate	To separate waste from non-waste materials; to sort waste according to type, such as sorting radioactive waste from non-radioactive waste or hazardous waste from non-hazardous waste.
sludge	Waste in a solid, semi-solid, or liquid physical form generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control device. Sludge does not include treated effluent from these plants/devices.
solid waste	The full regulatory definition of solid waste is found at 40 CFR 261.2. To summarize for LANL's purposes, a solid waste is any discarded material that is not excluded in the regulations. Discarded material includes materials that are abandoned (disposed of, burned/incinerated, accumulated speculatively, or sham recycled), inherently waste like, sham recycled, or recycled in specific ways (used in a manner that constitutes disposal, burning for energy recovery, or reclamation of certain types). Solid waste is a regulatory term and does not refer to the waste's physical form. As such, liquids, gases, and semisolid materials can meet the solid waste definition.
staging area (radioactive waste)	A registered area designated for the routine staging of radioactive waste before transport to a storage area or treatment, storage, and disposal facility.
storage area (radioactive waste)	A registered area where certified waste containers are stored for up to 1 year of the closed date before transfer for treatment, storage, or disposal elsewhere. Waste must be packaged for shipment in accordance with LANL waste acceptance criteria and the waste acceptance criteria of the final disposal facility.

transuranic (TRU) waste	Radioactive waste containing more than 100 nanocuries (3700 becquerels) of alpha-emitting TRU isotopes per gram of waste, with half-lives greater than 20 years, except for (1) high-level radioactive waste; (2) waste that the U.S. Department of Energy Secretary of Energy has determined, with the concurrence of the Environmental Protection Agency Administrator, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or (3) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61.
treatment	Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any waste to neutralize such waste or to recover energy or material resources from the waste or to render such waste nonhazardous or less hazardous; safer to transport, store, or dispose of; amenable for recovery; amenable for storage; or reduced in volume. Treatment of waste is frequently subject to applicable permits.
treatment and storage facility (TSF)	A permitted or interim status hazardous waste management unit at LANL, where hazardous or mixed waste may be stored up to 1 year or treated before transport offsite for disposal.
universal waste	Certain of the following types of hazardous waste are subject to the universal waste requirements of 40 CFR §273 and NMAC 20.4.1.1000; for example, aerosol cans, batteries, lamps, pesticides, and mercury thermostats. The universal waste requirements ease some of the regulatory requirements for collecting and managing these common waste types.
used oil	Any oil that has been refined from crude oil or any synthetic oil that has been used and, as a result of such use, is contaminated by physical or chemical impurities.
used oil generator	Any person, by site, whose act or process produces used oil or whose act first causes used oil to become subject to regulation.
waste acceptance criteria (WAC)	Criteria that must be met before a waste is accepted for treatment, storage, or disposal. WAC may involve the physical form of a waste; a waste's container; its radioactivity, packaging, labeling; etc.
waste characterization	The determination of a waste's physical, radiological, biological, and chemical characteristics with sufficient accuracy to permit proper classification and management.
Waste Compliance and Tracking System (WCATS)	A software application that was specifically designed to manage LANL's waste from cradle to grave. The system provides the proper support needed for characterization, generation, processing, and shipment of waste created at LANL.

waste generator	Within the Laboratory, anyone who discards material, destroys it, releases it into the environment, or decides that it is not going to be used. The individuals who make these decisions are normally process personnel and/or front-line managers who are closest to the work activity. These individuals are actively engaged in or are actively overseeing waste- generating work activities. Specific job titles for these individuals will vary among different organizations.
waste management	The planning, coordination, and direction of those functions related to generation, handling, treatment, storage, transportation, and disposal of waste, as well as associated surveillance and maintenance activities.
waste management coordinator (WMC)	The individual responsible for coordinating waste management activities on behalf of waste generators, line managers, facility managers, field project leaders, waste management groups, and other LANL organizations. This individual also coordinates resolution of waste management issues on behalf of his/her waste-generating organization and reviews documents pertaining to the management of waste.
waste stream	Each waste material generated from a single process or from an activity that is similar in the materials from which it was generated, similar in its physical form and hazardous constituents, and distinguishable from other wastes by U.S. Environmental Protection Agency hazardous waste numbers and land disposal restriction status.
waste stream profile	The Waste Compliance and Tracking System (WCATS) record associated with a task, container, waste stream, etc.

Module 1

Module 1 - Introduction to Waste Management

Module Objectives

After completing this module, you will be able to recognize:

- *the importance of waste management at LANL*
- *the waste management process*
- *the regulatory drivers of waste management at LANL*
- *definitions of waste*
- *the roles and responsibilities of Waste Generators and Waste Management Coordinators*
- *consequences of non-compliance regarding hazardous waste*

The Importance of Waste Management at LANL

A critical part of LANL's mission is managing waste safely to protect the public, workers, environment, and national security assets and to perform its operations effectively. LANL must comply with federal and state laws and regulations regarding waste management and incorporates those regulations into local policies, procedures, and practices.

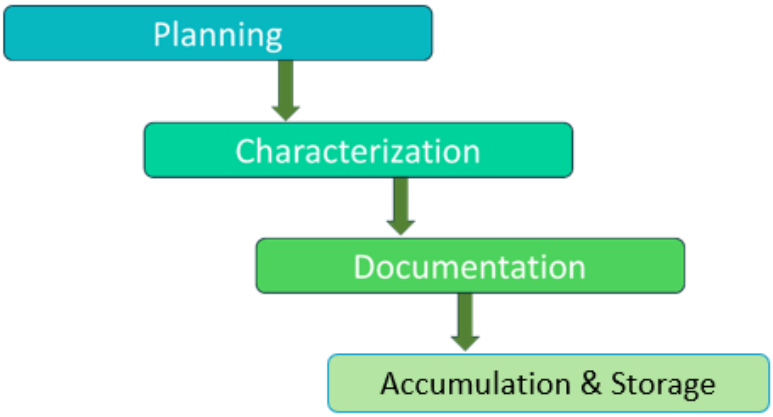
At LANL waste is routinely generated during various ongoing activities, such as testing, research and development, manufacturing, maintenance, etc. We hold to a high standard in managing that waste efficiently, from minimizing waste to disposing of waste properly.

LANL policy documents require compliance with applicable regulations, specifically regarding hazardous waste. **Waste Generators are liable for noncompliance with environmental regulatory requirements.** Even when there is assistance provided by a Waste Management Coordinator, the Waste Generators can be held accountable with serious consequences for improper management. (More information is on pg. 26.)

The Waste Management Process

The waste management process starts at the time of planning and continues through ultimate disposal, often referred to as “cradle-to-grave” waste management. There are various phases to this process which are addressed in LANL policy.

The focus of this class is on four (4) phases of this process as shown below, as well as requirements for emergencies in Satellite Accumulation Areas and Central Accumulation Areas.



Emergency Requirements for Hazardous Waste Areas

Regulatory Drivers for Waste Management at LANL

The following are the primary regulatory drivers for waste management at LANL, including Federal, State, and internal LANL policies. (See Appendix F "Regulatory Drivers – Descriptions" and Appendix G "References and Links" section at the end of this manual.)

Federal Regulatory Drivers:

- *Resource Conservation and Recovery Act (RCRA)*
- *Hazardous and Solid Waste Amendments (HSWAs)*
- *Toxic Substances Control Act (TSCA)*
- *Hazardous Materials Transportation Act (HMTA)*
- *Code of Federal Regulations (CFR): 40 CFR Parts 260 – 273 & 279*
- *DOE Orders (DOE O 435.1, Chg. 2 Radioactive Waste Management Manual.)*

DOE O 435.1 Chg. 2 *"The objective of this Order is to ensure that all DOE radioactive waste is managed in a manner that is protective of worker and public health and safety, and the environment."*

State Regulatory Drivers:

- *New Mexico Hazardous Waste Act (NMHWA)*
- *New Mexico Administrative Code (NMAC), Title 20, Chapter 4.1*

Hazardous waste management requirements are specified in New Mexico regulations (*Title 20 of the New Mexico Administrative Code, Chapter 4.1*), which incorporate federal regulations in *Title 40 of the Code of Federal Regulations, Parts 260-273 & 279*. Together, these regulations specify detailed requirements for hazardous waste generation, identification, characterization, short-term accumulation and longer-term storage, treatment, disposal, and recordkeeping.

Internal Regulatory Documents:

- *Triad, LLC/DOE Contract*
- *LANL Policy and Procedures*

  The policy page on LANL Inside has all of the policy documents as well as functional series documents that provide necessary additional information. (See the LANL Policy page for the most current versions of these documents.)

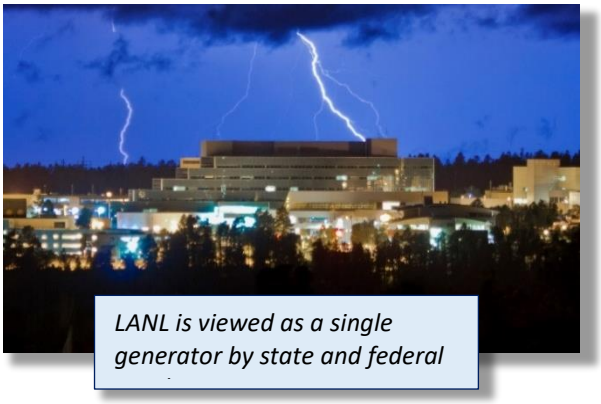
  - *P409 Rev. 9, LANL Waste Management*

Waste and Waste Generators

Definition of Waste

In general, a waste is a material that has been declared as a waste by a waste generator or a material that is no longer being used for its intended purpose, has no further use, or is discarded. The term “waste” includes any material that is abandoned, thrown away, destroyed, released into the environment, or not put to use. (See 40 CFR 261.2 Definition of solid waste.) It is important to note that the term "solid waste" very broadly includes solids, semi-solids, liquids, and contained gases. Chemicals in storage that are no longer usable and that cannot be recycled or reclaimed are considered to be wastes. In addition, materials that can no longer be used for their intended purpose can be considered "spent" which also qualifies as a "waste."

Definition of Waste Generators



LANL is viewed as a single generator by state and federal

A waste generator is any person* (facility, owner, or operator) whose act or process produces waste or whose act first causes waste to become subject to environmental regulations (40 CFR 260.10). Generators must be knowledgeable and able to determine the type of waste prior to or upon generation. In the context of waste management, these are individuals who are actively engaged in or actively overseeing waste-generating work activities. Their job titles vary across LANL, including supervisor, project manager, construction manager, maintenance manager, program leader, researcher, chemical owner, or principle investigator.

**Person is defined as “an individual, trust, firm, joint stock company, Federal Agency, corporation (including a government corporation), partnership, association, State, municipality, commission, political subdivision of a State, or any interstate body.” (40 CFR 260.10)*

Definition of Hazardous Waste Generators

A *hazardous* waste generator is any employee or nonemployee working at LANL who generates, accumulates/stores, manages or requests disposition of hazardous waste.

Generators shall manage, handle, accumulate and disposition all wastes in a manner that minimizes the impact of the waste on human health, the environment and complies with all applicable laws and Laboratory policies. When waste is generated, it must be managed in accordance with state and federal regulations. Generators must be able to ensure that all regulated constituents in a waste stream are characterized, documented, and in compliance with applicable regulations and requirements.

Waste Generator Responsibilities

1. *Plan waste generation and management (as per SD400, Environmental Management, and FSD-P409-0100, Waste Planning).*
2. *Minimize waste: Reduce risk and waste volume as described in EPC-ES-GUIDE-016, Pollution Prevention is Source Reduction.*
3. *Characterize waste: Provide and certify accurate, complete, and current waste characterization information, ensuring that regulated constituents in waste streams are identified.*
4. *Manage waste containers, store waste containers per WMC direction as per FSD-P409-0600, Waste Accumulation and Storage.*
5. *Provide complete and accurate characterization information to be uploaded into the Waste Compliance and Tracking System (WCATS)*.*
6. *Segregate waste streams in accordance with compatibility requirements.*
7. *Maintain documentation.*

**Note: Not all Waste Generators use WCATS (for example, foreign nationals). More information on the Waste Compliance and Tracking System (WCATS) is in Module 3.*

Waste Management Coordinators (WMCs)

Each LANL group, division, or facility has a WMC who is the primary contact for waste management and pollution prevention/waste minimization efforts. The WMC is familiar with the waste-generating processes and procedures of that organization and can assist you in meeting federal, state, and internal waste management requirements.

WMCs – Available to Assist

Waste Management Coordinators are available to assist Waste Generators and waste generating organizations in the following:

1. *Waste planning activities as described in FSD-P409-0100, Waste Planning*
2. *Pollution prevention activities with the assistance of the Pollution Prevention group and as described in EPC-ES-GUIDE-016, Pollution Prevention is Source Reduction*
3. *Characterization of waste and identification of compatibility concerns*
4. *Review of the Waste Compliance and Tracking System (WCATS) Waste Stream Profiles to verify generator signature and characterization*
5. *Management and inspection of registered waste storage areas in their assigned facilities as described in P409 (Waste Generators also carry out inspection duties depending on their area)*

WMCs - Responsibilities

1. *Safe and compliant packaging of waste*
2. *Submission of waste disposal requests per TP-P409-0700, On-Site Waste Management Field Tasks*
3. *Managing waste shipment dates/deadlines; communication with WM-WGS, WM-WMS and EPC-WMP if waste shipment dates are nearing regulatory deadlines for storage*
4. *Serving as the primary point of contact for facilities and/or FODs on waste management compliance issues, including inspections and assessments*
5. *Sharing of waste management information to generators in their facilities*

Note: (See P409 for complete list of responsibilities of Waste Generators and Waste Management Coordinators.)

Always contact your WMC for help with waste management

Consequences of Non-Compliance Regarding Hazardous Waste

LANL policy documents require compliance with applicable regulations, specifically regarding hazardous waste. Waste Generators are liable for noncompliance with environmental regulatory requirements. The following table describes the consequences of noncompliance.

Potential Consequences of Noncompliance with Hazardous Waste	
Disciplinary Action	May include: ➢ leave without pay, ➢ termination, and/or ➢ written or oral reprimand.
Civil Violations*	May result in fines and penalties up to: ➢ $27,500/day per violation or ➢ $50,000/day per violation for chronic violations May include: ➢ loss of permits required to operate, or ➢ shutdown of operations.
Criminal Violations*	Classified based on: ➢ intentional violations; ➢ inadequate supervision of workers committing intentional violations; ➢ intentional failure to correct violations, which can result in – fines and penalties up to $50,000/day and/or; – 2 years in prison. May include: ➢ loss of permits required to operate or shutdown of operations.
Administrative Action	May include: ➢ loss of permits required to operate or ➢ shutdown of operations.
Fines and penalties may be retroactive and are nonallowable costs.	

Module 2

Module 2 - Planning

Module Objectives

After completing this module, you will be able to recognize:

- *planning requirements;*
- *pollution prevention and waste minimization methods.*

Planning Requirements:

All work at LANL is planned work. Planning identifies activities with enough detail to identify potential wastes, estimate waste volume, and prepare for appropriate packaging, storage, transport, treatment, and disposal activities associated with those wastes.

Waste planning provides the steps for waste generating organizations to plan their activities and inform WM-WGS, WM-WMS and EPC-WMP personnel so that adequate space, containers, equipment, personnel, and permits are available to support the work without interruption or delay.
Before generating any type of waste, Waste Generators should assess whether the waste generated has a disposal path. Contact your facility WMC, who will offer guidance in many areas.

As stated in P300, Integrated Work Management, all work at LANL is planned work. Planned work activities should have enough detail to:

- *estimate waste volume; and*
- *prepare for appropriate packaging, storage, transport, treatment, and disposal activities associated with those wastes.*

Effective waste management planning ensures that:

- *Pre-start requirements (such as regulatory notifications, permit modifications, and qualified personnel/subcontractors) are met before activities begin.*
- *There is adequate funding for waste planning, permitting, packaging, characterization, storage, treatment, transportation, and disposal path forward.*
- *The waste meets the requirements of both LANL Waste Acceptance Criteria (WAC), and an appropriate off-site receiving facility's WAC.*
- *DOE review and approval is completed for any waste that does not have a disposal pathway.*
- *There is adequate floor space, equipment, and qualified waste management personnel available to accommodate expected waste volumes.*
- *Responsible personnel and organizations are identified, including the assigned WMC, NPI Acceptable Knowledge (AK) Specialist/Technologist (for TRU and MTRU), waste generator, and alternates.*
- *Waste management is effectively integrated into work and project schedules.*
- *Waste management requirements are effectively flowed down to subcontractors, as needed.*

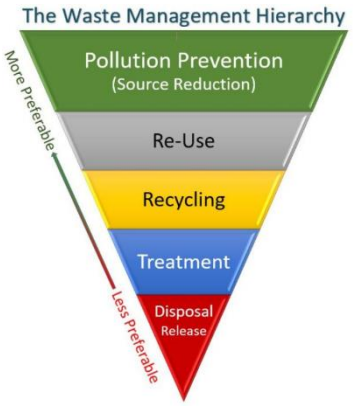
Pollution Prevention (P2) and Waste Minimization:

Federal & State Laws

Federal and state laws require LANL to have a pollution prevention/waste minimization program in place. As part of planning, organizations and personnel must investigate methods for reducing waste volume and toxicity.

Methods of Pollution Prevention and Waste Minimization

- *Reuse or recycle the waste.*
- *Eliminate the waste stream entirely or eliminate radioactive and/or chemical constituents via substitution.*
- *Reduce the amount of waste generated or the concentration of radioactive and/or chemical*
- *constituents in the waste.*
- *Treat the waste to change the physical, chemical, or biological nature of a hazardous waste.*



Green is Clean Program: Reducing Low – level Waste

- Accepts waste that has been declared radiologically clean from radiological controlled areas (RCAs).
- Waste predominantly consists of “room trash” such as personal protective equipment (PPE), paper towels, and cardboard, which can all be disposed of as municipal waste via the Green is Clean program.

See the Green is Clean web site for more information.

Green Is Clean waste container

Methods of P2 and Waste Minimization to Implement

Consider implementing the following pollution prevention/waste minimization opportunities for your processes to eliminate or minimize the amount of waste released into the environment.

Additional Methods of Pollution Prevention (P2) and Waste Minimization	
Method	**Description**
Material substitution	Replacing hazardous materials with non- or less-hazardous materials; replacing disposable materials with reusable materials
Good housekeeping	Keeping the workplace neat, clean, and free from unneeded hazards
Hazard segregation	Keeping different kinds of wastes and incompatible chemicals separate
Chemical sharing	Trading unused/unspent chemicals with other organizations at LANL using the Los Alamos chemical database.
Preventative Maintenance	Ensuring equipment & facilities run smoothly to avoid high costs of unplanned breakdowns

Prime Candidates for Recycling

- *lead-acid batteries*
- *gel cell batteries*
- *unused laboratory chemicals*
- *compressed gas cylinders*
- *scrap metal*
- *solder waste*


Used Batteries


Nitrous Oxide Cylinders


Scrap metal

Note: There is no recycling of glass at LANL. Recycling guidance is found on the Waste Support homepage.

How can you prevent pollution and minimize waste?

- *Participate in P2/waste minimization projects at LANL.*
- *Contact the EPC Environmental Stewardship (EPC-ES) Pollution Prevention program.*
- *See EPC-ES-GUIDE-016, Pollution Prevention is Source Reduction, for specific P2 processes.*
- *Learn about LANL's recycling programs.*

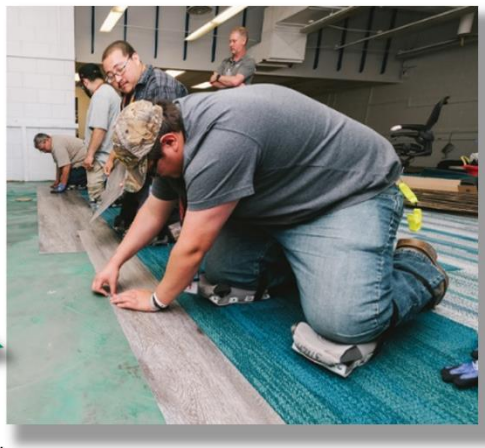
From LANL News:

LANLInside

Carpet and the carbon footprint: Lab expands sustainable flooring program

Recycled carpet now available for offices, spaces Lab-wide

"Craft teams learn to install sustainable flooring.... Now more Lab employees than ever before can have recycled carpet."



https://int.lanl.gov/news/news_stories/2024/june/0604-recycled-carpet.shtml

For help in applying pollution prevention/waste minimization techniques or identifying recyclable wastes...

Contact your WMC!

Module

3

Module 3 - Waste Characterization and Documentation:

Module Objectives

After completing this module, you will be able to recognize:

- *examples of waste streams that may be generated at LANL, including listed waste and characteristic waste;*
- *a general description of waste characterization and waste compatibility;*
- *documentation needed to substantiate the waste characterization;*
- *primary methods of waste characterization, including acceptable knowledge and sampling and analysis; and*
- *waste categories.*

Examples of Waste Streams at LANL

Hazardous Waste*:* A solid waste that is not excluded from regulation under 40 CFR 261.4(b) and that is listed in 40 CFR 261, Subpart D; exhibits any of the characteristics identified in 40 CFR 261, Subpart C; or is a mixture of solid waste and one or more hazardous wastes listed in 40 CFR 261, Subpart D. Hazardous waste may be a "mixed waste," which is waste that contains hazardous waste that is subject to the HWA and the Resource Conservation and Recovery Act and radioactive source, special nuclear, or byproduct material subject to the Atomic Energy Act, 42 U.S.C. § 2011, et seq.

Transuranic (TRU) Waste: Radioactive waste containing more than 100 nanocuries (3700 becquerels) of alpha-emitting TRU isotopes per gram of waste, with half-lives greater than 20 years, except for (1) high-level radioactive waste; (2) waste that the U.S. Department of Energy Secretary of Energy has determined, with the concurrence of the Environmental Protection Agency Administrator, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations; or (3) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR Part 61. *(e.g., contaminated gloves, tools, rags, soils, and equipment from nuclear weapons production.)*

Mixed Transuranic (MTRU) Waste: Transuranic waste determined to contain both a hazardous component subject to the Resource Conservation and Recovery Act (RCRA), as amended, and a radioactive component subject to the Atomic Energy Act of 1954, as amended, shall be managed in accordance with the requirements of RCRA and DOE O 435.1, Radioactive Waste Management, and DOE M 435.1. May be corrosive, ignitable, reactive, or toxic in addition to being radioactive. *(e.g., solvents, RCRA metals, or acids contaminated with TRU radionuclides.)*

Low-Level Radioactive Waste (LLW): Radioactive waste that is not high-level waste, spent nuclear fuel, transuranic waste, byproduct material (as defined in Ch. 2, Sec. 11e. (2) of the Atomic Energy Act of 1954, as amended), or naturally occurring radioactive material. The storage and disposal of radioactive waste is regulated by government agencies to protect human health and the environment. *(e.g., contaminated lab clothing or gloves from handling medical isotopes, discarded smoke detectors containing americium-241.)*

Mixed Low-Level Radioactive Waste (MLLW): Radioactive waste that contains both source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954, as amended, and a hazardous component is also subject to the Resource Conservation and Recovery Act (RCRA), as amended. *(e.g., contaminated rags soaked in flammable solvent and radioactive phosphorus-32, vials containing both radioactive technetium-99 and corrosive acid.)*

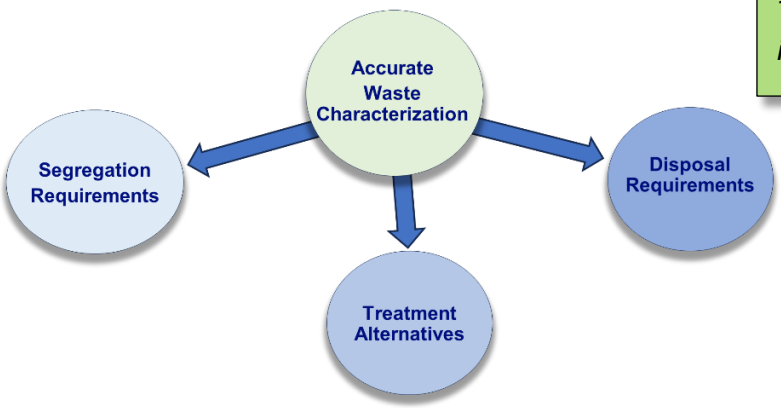
Municipal Solid Waste: Municipal solid waste typically includes one of three types of waste: construction and demolition debris (*e.g., mixtures of soil, asphalt, concrete, wood etc.*), commercial solid waste (e.g., *office type trash, packaging materials, plastic wrap, cleaning chemicals)*, and non-contaminated industrial waste (*e.g., non-contaminated laboratory wastes, PPE*.) Municipal solid waste is compliant with permit and acceptance criteria for disposition at the Los Alamos County Eco Station or LANL approved NM solid waste disposal facilities.

Note: There are some exemptions regarding hazardous waste regulations for household wastes. BUT as an institution, LANL doesn't have those same exception. Therefore, ALL waste at LANL is regulated.

Waste Characterization

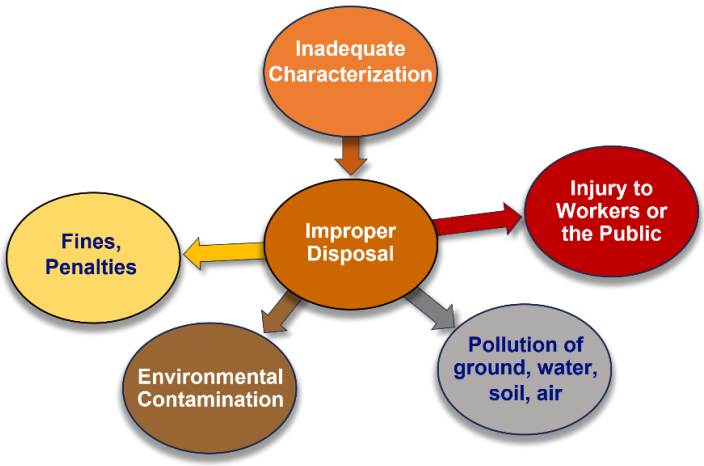
Waste characterization is the process of determining the chemical, physical, biological, and radiological characteristics of a given waste stream.

The waste characterization process must result in a legally defensible description of the waste.



Characterization of a waste stream must be accurate to determine segregation requirements for storage, treatment alternatives, and/or disposal requirements.

Inadequate characterization can lead to improper disposal, resulting in fines and penalties, environmental contamination, and pollution (for example, ground and/or surface water, soil, and air pollution) as well as injury to workers or to the public.



Waste characterization applies to all wastes and must be made at the point of waste generation. The more complex and heterogeneous a waste is, the more complicated the characterization process will be.

In order to ensure wastes are properly managed according to applicable RCRA regulations, **generators must decide whether the material in question should be managed as hazardous, mixed, radioactive waste, or non-hazardous waste.**

It must also be determined if any hazardous wastes are excluded from regulation (see page 40 “Excluded Hazardous Waste”, ref. 40 CFR 261.4). If the waste is *not* excluded under 40 CFR 261.4, the generator must then use knowledge of the waste to determine whether the waste is a listed or characteristic waste.

Waste (Chemical) Compatibility

Heterogeneous – made up of different forms or components.

Waste compatibility is an estimate of how a waste might chemically or biologically react with other materials. This includes whether the waste will react with water, air, the waste container, absorbent, other wastes, etc. Wastes or materials that react with each other are called incompatible.

For heterogeneous wastes, compatibility also includes whether different *components* of the waste will react with each other. Such chemical or biological reactions may damage the container, generate heat, cause a fire or explosion, emit flammable or toxic gases, etc. Waste characterization leads to an accurate understanding of waste incompatibilities and ensures that incompatible wastes are managed in a manner that prevents them from reacting and causing ESH issues.

Upon request, Waste Generators must provide the documentation used in making waste compatibility characterizations. Compatibility characterizations should be documented in WCATS for each waste stream profile (WSP). One exception may be to maintain the data at the waste container level for Lab-wide WSPs.

Determining chemical compatibility must consider reaction with air, water, the container, and other wastes.

Examples of waste incompatibilities include:

- *incompatible materials mixed within a container,*
- *compatibility of the waste with its packaging/container, and*
- *segregation of incompatible wastes in storage and transport.*

Methods of waste segregation include packaging liquids and solids separately and the use of dikes, berms, walls, or other barriers.

Note: See "Incompatibility Table" in Appendix C.

Documentation of Waste Characterization in WCATS

Once the characterization is made, generators should document the results of the characterization in a Waste Stream Profile (WSP) in WCATS. Records must be kept for at least three years from the date that the waste was last sent to on-site or off-site treatment, storage, or disposal.

These records support the generator's knowledge of the waste and include results and documentation of any tests, sampling, waste analyses, or other determinations used to demonstrate the validity and relevance of such tests.

The Waste Compliance and Tracking System (WCATS) is a LANL-developed software for documenting waste characterization, generation, container management, onsite waste processing, both onsite and offsite waste shipments and waste disposal for all wastes generated at the Laboratory.
The process for creating and documenting Waste Stream Profiles (WSPs) in WCATS is also provided in EPC-WMP-WCATS-GUIDE-002, Waste Compliance and Tracking System (WCATS) User Guide and in the UTrain course #8504, WCATS: Waste Documentation.

Primary Methods of Characterization

Generators can characterize wastes by:

- *Acceptable Knowledge*
- *Sampling and Analysis*

> *Acceptable Knowledge or "AK" is the use of process knowledge, waste analysis data, and/or records of analyses performed before the effective date of RCRA regulations to satisfy all or part of the waste characterization requirements of 40 CFR §264.13.*

Acceptable Knowledge (AK)

Acceptable Knowledge relies on existing documentation and data to accurately identify the physical, chemical, radiological, biological, and security aspects of the waste. It is what is already known about the waste and what can be documented in a legally defensible way. This information itself is referred to as Acceptable Knowledge.

AK, at a minimum, must demonstrate and communicate the following:

- *a detailed description of the process that generated the waste;*
- *material inputs to the process (mass-balance calculations);*
- *the physical form of the waste;*
- *the function of the materials/chemicals used in the process (e.g., were organics used for the solvent properties or as an ingredient); and,*
- *the time period relevant to process operation.*

AK may be documented in laboratory logbooks or operating procedures that describe the process, approved solid waste profiles, Safety Data Sheets (SDSs), analytical data results, waste addition logs, test plans, and/or hazard or safety analysis plans that list material input/output or process flow diagrams.

Documentation of Acceptable Knowledge must be:

- *traceable to a waste stream;*
- *accurate, sufficient, current (i.e., updated); and*
- *relevant to the waste stream's generation, characterization, and management;*

All AK documentation must be uploaded into WCATS within the waste profile supported by the documentation. This process will enable reviewers to approve the waste profile and make the documentation readily available to waste inspectors. If AK documentation is lacking, sampling and analysis of the waste stream must be initiated and documented in WCATS in a timely fashion to avoid RCRA penalties.

Common Sources of Information for Acceptable Knowledge Documentation*		
Process design documents	Final safety analysis reports	Unreviewed safety questionnaire determinations
Formal plans/procedures describing the waste generating process	Detailed process descriptions and/or narratives	Authorized procedures or other process input controls
Technical Safety Requirements	Standard Operating Procedures	Integrated Work Documents
Hazard Control Plans	Safety Data Sheets	Activity Hazard Analyses
Detailed Operating Procedures	Raw material lists	Occupational Assessments
Industrial Hygiene sampling results	Radiation protection survey results	Physics of radionuclide production
Historical waste stream profiles	Radioactive Work Permits	Proper shipping descriptions
Historical reports and/or data that can be logically linked to the waste	Areas and/or buildings where each waste stream is generated	Documentation developed by other LANL procedures or policies
Accelerator and beamline characteristics documentation	Material and component characteristics documentation	Accelerator, facility, and/or process operational history
Consent Order site investigation reports, sampling results, work plans, description documents	National Environmental Protection Act documentation	Documentation required or identified in DOE orders, manuals, and standards
Site, project, or process walk down results	Readiness documentation	Inventory control documentation
Inspection documentation	Maintenance records	AK Reports
Scientific reports	Radiological decay calculations	Natural attenuation studies
Toxicological profiles	Technical basis documents	Dose to Curie calculations
Historic radiological, chemical, physical, or biological data combined with documentation proving the generating process has not changed	Listed Source Review reports	Process logs, laboratory notes, and batch records
Manufacturing specifications	Plans and drawings	Log sheets
*This is not an exhaustive list. Other documents that help to identify the radiological, chemical, physical, biological, and classification characteristics of the waste may also be acceptable.		

Sampling and Analysis

Sampling and analysis is a waste characterization method that involves collecting representative samples of the waste and submitting those samples to a certified laboratory for analysis. It is representative of the waste stream and is collected using approved methods.

Representative samples must "*exhibit average properties of the whole*" and must be defensible as a representative sample of the entire waste stream.

Wastes must be sampled and analyzed whenever there is an information gap that is not adequately addressed by AK. Although Sampling and Analysis is preferred by the EPA and NMED as the most defensible method of characterizing waste, AK may be substituted for analytical data if it is complete and properly documented.

Sampling and analysis can also be used to characterize waste when any of the following conditions exist:

- *insufficient AK to characterize the waste,*
- *unknown constituents exist in the waste stream, or*
- *analysis is required and/or requested by the receiving TSDF offsite.*

Waste and material must be managed to prevent tampering, additions, or other changes. However, unless it can be shown that a waste or material has not been tampered with, added to, or otherwise changed in any way, analytical data that is older than three years is treated as AK. Waste Management Coordinators are generally the ones to submit requests for sampling and analysis services. (The sample request form can be found at epc.lanl.gov.)

Waste Characterization

Primary Methods of Characterization

➢ *Sampling and Analysis*

What to do:

- DO submit a request for analysis.
- DO recharacterize waste when the process changes.
- DO sample or characterize all unknown waste.
- DO notify your WMC when the process has changed.

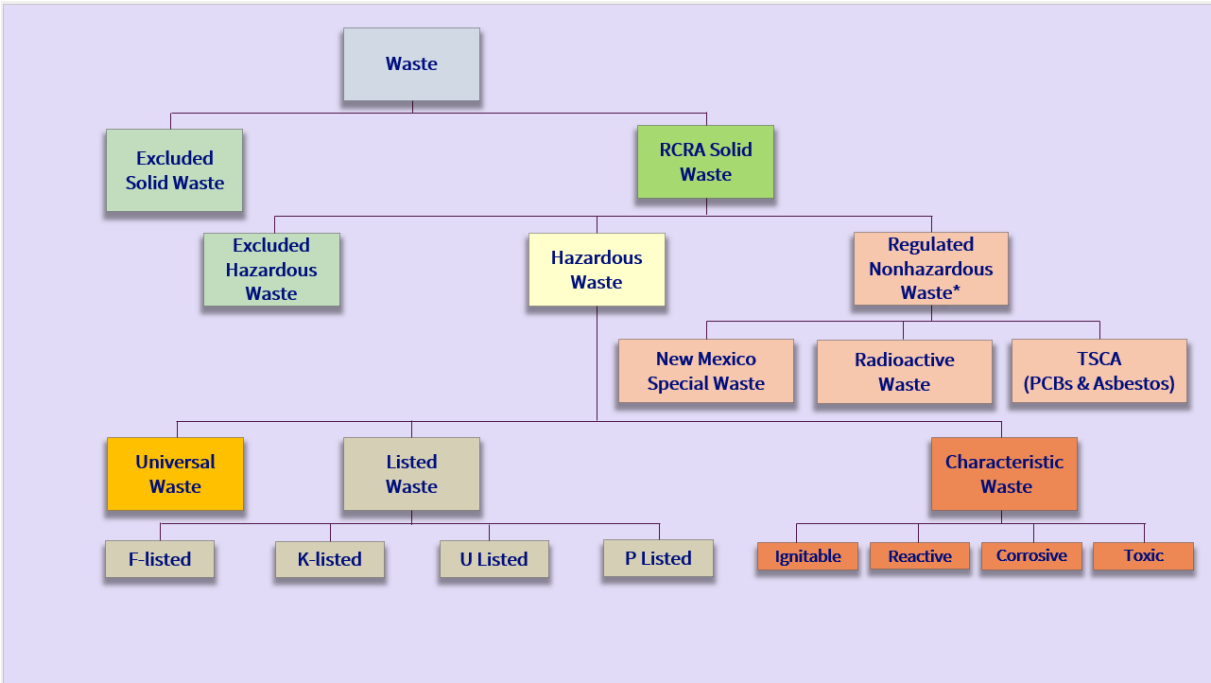
What NOT to do:

- DO **NOT** characterize waste without proper training.
- DO **NOT** guess at RCRA constituent levels.

For help with waste characterization, contact your WMC!

Waste Categories

If characterization indicates that material is a waste, then the next step is to determine the category. The diagram below provides a logical flow for making a waste, solid waste, or hazardous or nonhazardous waste characterization.



Waste

A waste is a material that is no longer being used for its intended purpose, has no further use, or has been discarded.

Excluded Solid Waste

Some waste streams that meet the definition of a solid waste are excluded from RCRA regulations. The following partial list of solid waste streams is excluded from or not regulated by RCRA:

- *domestic sewage, sewage mixtures (regulated by the Clean Water Act [CWA]);*
- *industrial wastewater point source discharges (CWA);*
- *source, special nuclear, and byproduct materials (Atomic Energy Act);*
- *irrigation return flow (CWA); and*
- *in situ (in-place) mining wastes.*

RCRA Solid Waste

A RCRA solid waste is any discarded material that is a solid, liquid, contained gas, semisolid, or sludge that

- *is considered inherently waste like;*
- *are military munitions identified as a solid waste;*
- *is recycled; or*
- *is abandoned by being*
  - *disposed of;*
  - *burned or incinerated; or*
  - *accumulated, stored, or treated (but not recycled) before or instead of being abandoned*

Excluded Hazardous Waste

Some waste streams that meet the definition of a solid waste are excluded from being considered a *RCRA* hazardous waste. These include samples of wastes as follows:

Waste Samples:
- Samples that are in transit to or from analysis
- Samples stored in a laboratory before/after analysis
- Samples used in treatability studies

*Samples are collected for the sole purpose of testing to determine characteristics or composition of the waste stream.

Household Wastes: Lifetime exemption from RCRA

Waste used at LANL generated from household commercial chemical products that ...
- exhibit a RCRA characteristic, or
- contain listed constituents

...must be managed as hazardous waste.

Regulated Non-Hazardous Waste

Regulated non-hazardous waste may meet the definition of a solid waste under RCRA but may not meet the RCRA hazardous waste definition. In some cases, these waste types may be regulated under another statute, such as TSCA or HMTA.

NM Special Waste

New Mexico special waste is regulated nonhazardous waste that has unique handling, transportation, or disposal requirements to ensure the protection of the environment and the health, welfare, and safety of the public. Types of New Mexico special waste include:

- *treated formerly characteristic hazardous (TFCH) wastes;*
- *asbestos waste;*
- *ash;*
- *infectious waste;*
- *sludge, except compost that meets the provisions of 40 CFR 503;*
- *industrial solid waste;*
- *spills of a chemical substance or commercial product;*
- *petroleum-contaminated soils; and*
- *unbound nano materials.*

Asbestos Waste

Infectious Waste

Radioactive Waste

Waste that has been determined to contain added radioactive material or activation products by either monitoring and analysis, acceptable knowledge, or both; or does not meet radiological release criteria.

TSCA (PCBs & Asbestos)

The Toxic Substances Control Act (TSCA) was decreed by Congress in response to public concern over growing evidence of the toxicological effects of chemicals introduced into the marketplace. TSCA is intended to provide protection from toxic substances manufactured, processed, distributed, or used in the United States.

Polychlorinated biphenyl (PCB) compounds and asbestos are the main TSCA-regulated substances at LANL. Examples of PCBs handled at LANL most often are capacitors and ballasts. (See page 55 of this manual for LANL PCB storage area requirements.)

TSCA regulations (40 CFR 700 series) include the following requirements:

- *New substances must be screened for health and safety hazards before the substances are marketed.*
- *Existing substances must be tested for health and safety hazards.*
- *Hazardous substances must be controlled for public protection.*

Hazardous Waste

A RCRA hazardous is always a solid waste (*not* excluded from regulation as a hazardous waste) and may be considered hazardous if it is a **listed** hazardous waste, OR a waste WITH a hazardous **characteristic (**ignitability, corrosivity, reactivity, or toxicity.)

Universal Waste

Lithium-ion battery from a laptop computer

Universal wastes are hazardous wastes commonly found in nonhazardous waste landfills. To prevent such illegal disposal, the EPA relaxes storage requirements for this category of waste to encourage the use of alternate methods of disposal. Universal wastes are subject to the universal waste requirements of 40 CFR 273 and include the following hazardous waste items:

- *batteries (i.e., lithium, nickel cadmium, nickel metal hydride),*
- *pesticides,*
- *mercury-containing equipment,*
- *discarded lamps that exhibit a hazardous characteristic (incandescent, mercury, fluorescent lamps)*
- *aerosol cans.*

Listed Waste

Listed waste streams are identified by the EPA administrator and are based on one of the following criteria:

- *The waste exhibits a characteristic (ignitable, corrosive, reactive, or toxic)*
- *The waste is fatal to humans*
- *The waste significantly contributes to an increase in serious irreversible or incapacitating reversible illness;*
- *The waste contains substances that have been shown to have toxic, carcinogenic, mutagenic, or teratogenic* effects on humans or other life forms; or*
- *The waste is capable of posing a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or managed.*

A solid waste becomes a hazardous waste if the waste stream is classified as F-listed, K-listed, U-listed, or P-listed.

Types of Listed Waste		
Waste Type	**Description**	**Examples**
F-listed	non-industry-specific/process-specific waste stream	spent solvents from electroplating operations
K-listed	industry-specific/non-process-specific waste stream	waste generated from the manufacturing of explosives
F and K codes may be used only if the source of the waste is known.		
U-listed	discarded commercial chemical products	benzene (U019)
P-listed	acutely hazardous, discarded commercial chemical products	beryllium powder (P015)
P and U codes are to be used for pure and unused compounds only. In a mixture, the P and U codes may be used only if the compound is the sole active ingredient.		

Characteristic Waste

Characteristic wastes are identified by the EPA administrator and are based on the following criteria:

- *the solid waste may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or in capacitating reversible illness AND*
- *the solid waste may pose a substantial present or potential hazard to human health or the environment when it is improperly treated, stored, transported, disposed of, or otherwise managed.*

A solid waste becomes a characteristic hazardous waste if it exhibits any of the characteristics of hazardous waste, as shown in the table below.

Note: See Appendix B: Hazardous Waste Tables for detailed lists of each type of waste.

Types of Characteristic Waste		
Waste type	**Description**	**Examples**
Ignitable D001 	• flashpoint <60°C (140°F) • subject to spontaneous combustion • flammable compressed gas as defined by the DOT • DOT oxidizer	naphtha ethanol
Corrosive D002 	• pH of ≤2.0 or ≥12.5 OR • a liquid that corrodes steel at a rate >0.25 in. (6.35 mm) per year at a test temperature of 55°C	sulfuric acid nitric acid potassium hydroxide
Reactive D003 	• normally unstable and readily undergoes violent change without detonating • reacts violently when mixed with water or generates toxic gases, vapors, or fumes • forms potentially explosive mixtures when mixed with water • cyanide- or sulfide-bearing waste that can generate toxic gases, vapors, or fumes when exposed to pH conditions between 2.0 and 12.5 • readily capable of detonation at standard temperature and pressure (STP) • DOT Division 1.1, 1.2, or 1.3 explosive	high explosives cyanide salts
Toxic D004–D043 	• meets or exceeds the maximum toxic concentration limits that are based on the toxicity characteristic leaching procedure (TCLP) test	some organics (e.g., chloroform) some metals (e.g., arsenic, barium, lead) some pesticides

Mixed Waste

Mixed Low-Level Radioactive Waste (MLLW): Radioactive waste that contains both source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954, as amended, and a hazardous component is also subject to the Resource Conservation and Recovery Act (RCRA), as amended. *(e.g., contaminated rags soaked in flammable solvent and radioactive phosphorus-32, vials containing both radioactive technetium-99 and corrosive acid, decontamination liquids with both chromium [a RCRA toxic metal] and radioactive cobalt-60.)*

Mixed Transuranic Waste (MTRU): Determined to contain both a hazardous component subject to the Resource Conservation and Recovery Act (RCRA), as amended, and a radioactive component subject to the Atomic Energy Act of 1954, as amended, shall be managed in accordance with the requirements of RCRA and DOE O 435.1, Radioactive Waste Management, and DOE M 435.1. May be corrosive, ignitable, reactive, or toxic in addition to being radioactive. *(e.g., solvents, RCRA metals, or acids contaminated with TRU radionuclides.)*

Hazardous Waste Rules

These rules act as safeguards to ensure that materials that have come into contact with hazardous waste, or are byproducts of hazardous waste management, are handled and disposed of according to the appropriate regulations.

Waste Generators must not mix hazardous and non-hazardous wastes. They must also not mix waste streams without the direction and/or approval of their Waste Management Coordinator.

The Mixture Rule

The mixture rule determines whether a mixture of non-hazardous waste with hazardous waste is considered hazardous based on the characteristics of the mixture.

Example: If a small amount of a characteristic hazardous liquid is mixed with a non-hazardous water, the mixture might not be considered hazardous since the water reduces its hazardous characteristics.

The Mixture Rule		
The mixture of…	**with…**	**is classified as a hazardous waste…**
non-hazardous waste	characteristic waste	if the mixture still exhibits the hazardous characteristic.
	listed waste	always.

The Derived -From Rule

The derived-from rule states that any waste generated from treating, storing, or disposing of a listed hazardous waste is also considered a hazardous waste, even if it appears non-hazardous on its own. **Example:** If a hazardous waste is incinerated, the resulting ash is considered a "derived-from" waste and is still regulated as hazardous even if it appears non-hazardous.

The Derived-From Rule	
Residue derived from…	**is classified as a hazardous waste…**
characteristic waste	if the residue still exhibits the hazardous characteristic.
listed waste	always.

For help with categories of waste or mixture rules, contact your WMC!

Module

4

Module 4 - Accumulation, Storage, and Emergency Requirements

Module Objectives

After completing this module, you will be able to recognize:

- *waste accumulation areas and requirements for each;*
- *emergency requirements for waste accumulation areas;*
- *the purpose of the contingency plan and the quick reference guide; and*
- *initial response recommendations for leaks and spills.*

Waste Accumulation Areas

After waste generated at LANL has been properly characterized and generated, including hazardous and radioactive waste, it is stored in an accumulation area before being moved to another location for treatment and/or long-term storage or disposal.

Must initially be registered with Environmental Protection and Compliance Division, Waste Management Programs Group (EPC-WMP) unless exempt from registration. WCATS must be used by WMCs to register, update, query, or decommission a storage area.

Waste generated from LANL operations are usually stored in waste accumulation areas before being moved to another location for treatment and/or long-term storage or disposal. The requirements and limitations address the following:

- *volume limits*
- *labeling*
- *container requirements*
- *time constraints*
- *location*
- *emergency equipment*
- *documentation*
- *inspections*
- *signs/postings*

Types of Accumulation Areas

The following are the types of accumulation areas at LANL:

Hazardous
Satellite Accumulation Area (SAA)
Central Accumulation Area (CAA)
Universal Waste Area (UWA)

Regulated Non-Hazardous Waste
New Mexico Special Waste Area
Used Oil Area (UOA)
PCB Area
Radioactive Waste Staging and Storage Areas

The requirements for each type of accumulation area vary with the primary difference being between hazardous and non-hazardous. **(The complete details of each area's requirements are provided in the charts in Appendix D.)**

Satellite Accumulation Area (SAA)

An SAA is an accumulation area for hazardous or mixed waste located at or near where waste is generated and must be under the control of the generator/operator of the process generating the waste. See 40 CFR 262.15. SAAs are the most common type of waste accumulation area at LANL.

SAAs can store 55 gallons or less of hazardous waste or 1 quart of liquid or 1 kilogram (2.2 pounds) of solids of acutely hazardous wastes.

There are no time constraints or SAAs unless volume limits are exceeded. Then waste must be transferred within three days to a

- *Central Accumulation Area (CAA),*
- *Treatment and Storage Facility (TSF) or*
- *Treatment, Storage and Disposal Facility (TSDF)*

Waste Generators shall contact designated WMC to coordinate waste disposal requests (WDRs):

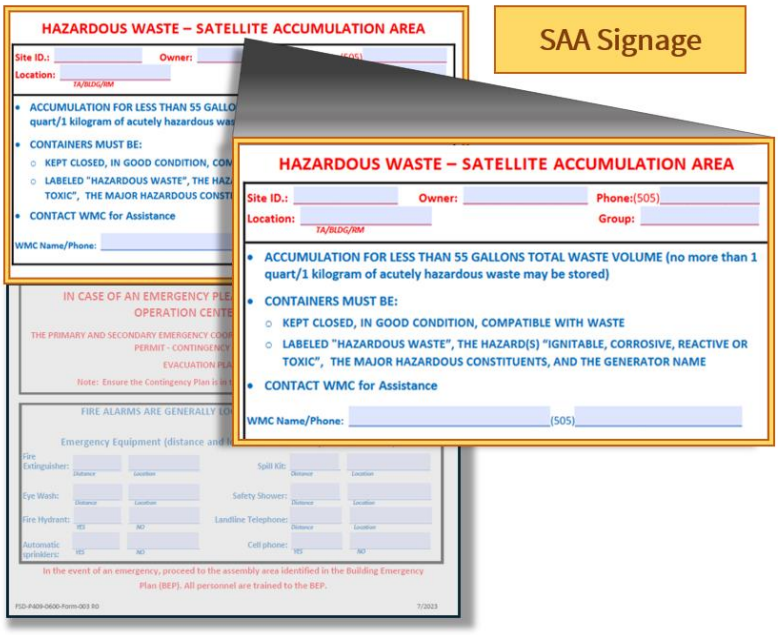
- *before the SAA volume limits are reached to coordinate waste disposal requests (WDRs);*
- *when the process generating the waste has ceased or likely will not continue in the foreseeable future; and*
- *when the waste generator work assignment changes due to separation, termination, transfer, or other similar action.*

Note: If you are at or near 50 gallons, contact your WMC.

Inspections: No inspections are **required** HOWEVER, at LANL as a best management practice, SAAs are *assessed* frequently to ensure compliance with regulations.

Waste Generators are not required to conduct SAA inspections, but they should expect *assessments* of SAAs at least monthly.

Signage: Hazardous Waste Area Signage is required to be posted to indicate that the area is a hazardous waste accumulation area. It is also required as a part of the Contingency Plan regarding emergency requirements.

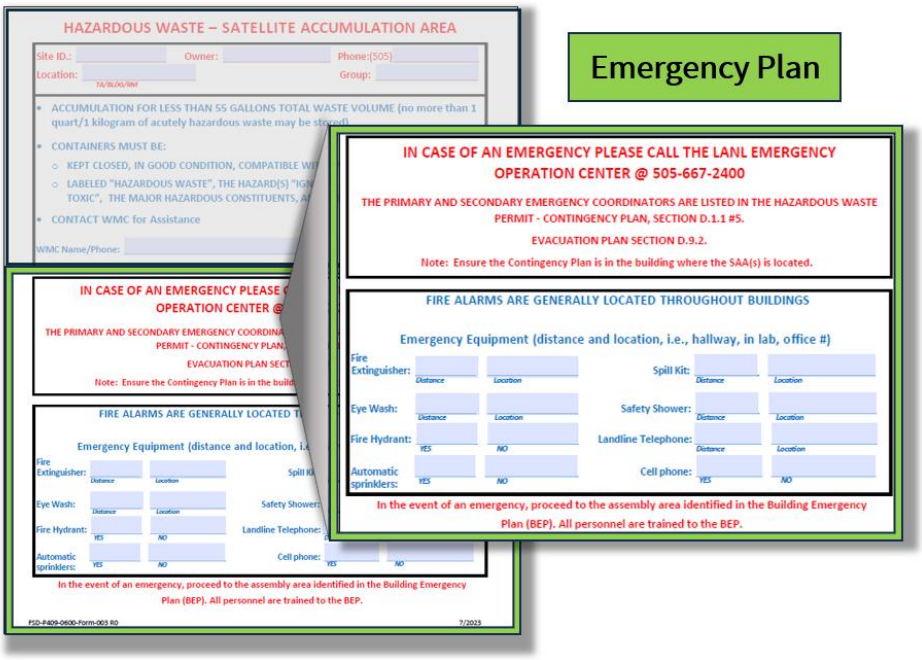


Emergency Procedures

Emergency equipment must be available according to FSD-P409-0600, *Waste Accumulation and Storage.* Clear emergency procedures must be in place in case of emergencies.

Generators working at an SAA must be familiar with the emergency procedures described in the Contingency Plan.

The Emergency Plan is found on the bottom half of the Hazardous Waste Sign and must be followed.

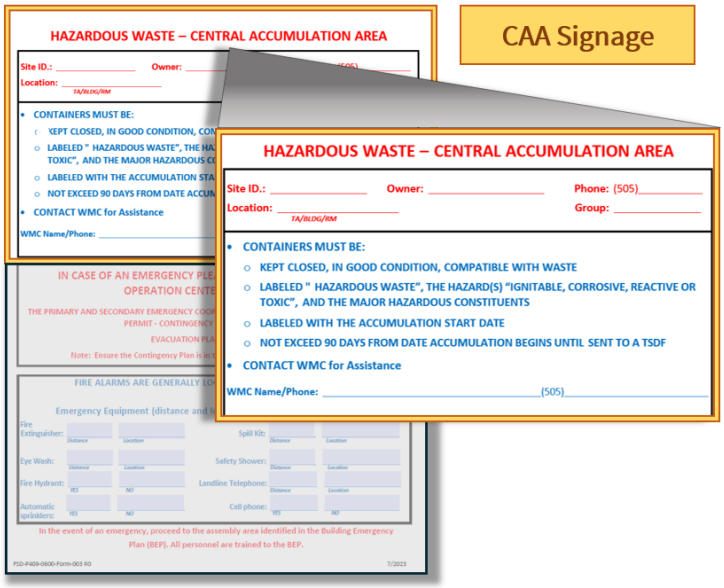


Central Accumulation Area (CAA)

A CAA is a designated space for accumulating hazardous or mixed waste in containers or tanks. Waste may not remain in the accumulation area longer than 90 days. See 40 CFR 262.17. Generators working at a CAA must be familiar with the emergency procedures described in the Contingency Plan.

Inspections: Written inspections are required weekly using the CAA Inspection Record. For instructions on filling out the CAA Inspection Record, refer to the Instruction for Use of the Inspection Record for Central Accumulation Areas.

Signage: Hazardous Waste Area Signage is required to be posted to indicate that the area is a hazardous waste accumulation area. It is also required as a part of the Contingency Plan regarding emergency requirements.

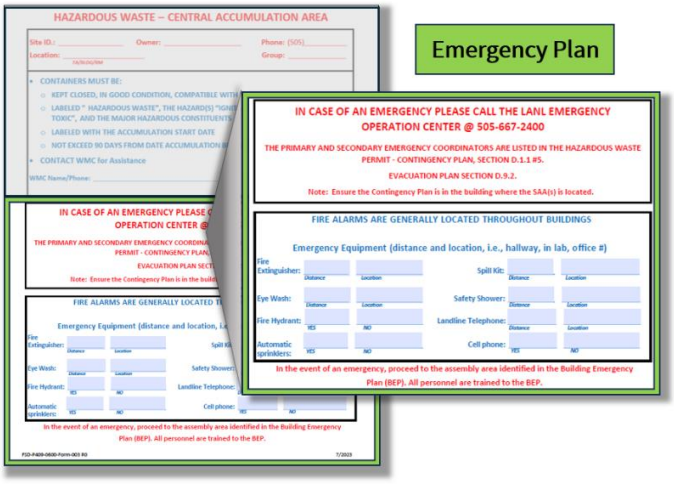


Emergency Procedures

Emergency equipment must be available according to FSD-P409-0600, Waste Accumulation and Storage. Clear emergency procedures must be in place in case of emergencies.

Generators working at an CAA must be familiar with the emergency procedures described in the Contingency Plan.

The Emergency Plan is found on the bottom half of the Hazardous Waste Sign and must be followed.

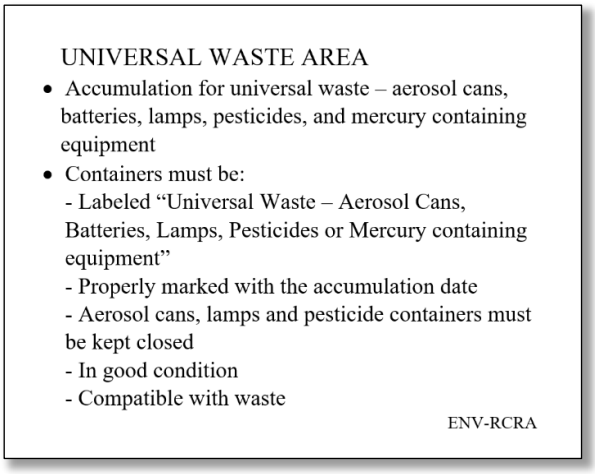


Universal Waste Area (UWA)

Universal wastes are hazardous wastes often found in nonhazardous waste landfills. To prevent such illegal disposal, the EPA relaxes storage requirements for this category of waste to encourage alternate methods of disposal. Universal waste requirements are found in 40 CFR 273.

Inspections: Not required.

Signage: Must have the words "Universal Waste Area."



UWA Signage

UWA Label

NOTE: Alkaline Batteries are NOT to be recycled. They CAN be thrown into the trash.

Used Oil Area (UOA)

Used Oil Label

A UOA is an area dedicated for the storage of used oil intended for recycling. Used oil means "any oil that has been refined from crude oil, or any synthetic oil that has been used and as a result of such use is contaminated by physical or chemical impurities [40 CFR 279.1]."

Inspections: Not required.

Signage: Not required.

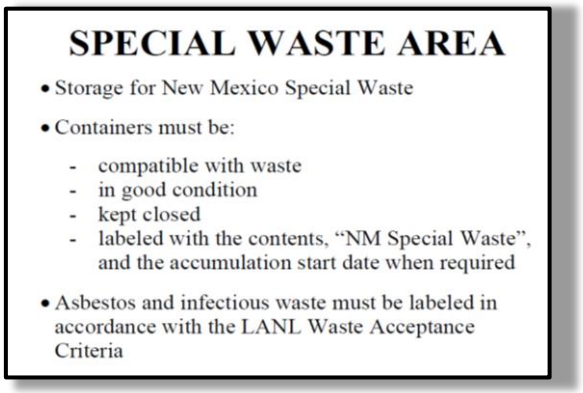
New Mexico Special Waste (NMSW) Storage Area

A NMSW Storage Area is an area for solid wastes with unique handling, transportation, or disposal requirements to ensure the protection of the environment and the health, welfare, and safety of the public.

- *Treated formerly characteristic hazardous (TFCH) wastes;*
- *Asbestos waste;*
- *Ash;*
- *Infectious waste;*
- *Sludge, except compost that meets the provisions of 40 CFR 503;*
- *Industrial solid waste;*
- *Spills of a chemical substance or commercial product;*
- *Petroleum-contaminated soils; and*
- *Unbound nano materials.*

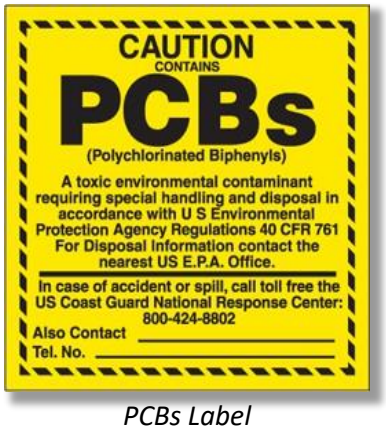
Example of a label for asbestos waste

Inspections: Not required. **Signage:** Must have the words "New Mexico Special Waste."



Polychlorinated Biphenyls (PCB) Storage Area

A PCB Storage Area is a location for the storage of items contaminated with PCBs. Waste that is characterized as PCB waste is stored in PCB waste storage areas and is subject to the Toxic Substances Control Act (TSCA). General PCB waste storage areas are used for the storage of PCB waste that is not hazardous under the Resource Conservation and Recovery Act (RCRA) or radioactive.



PCBs Label

PCB storage areas may be:

- *General PCB Waste Storage Area: storage up to 1 year*
- *Temporary PCB Waste Storage Area: storage up to 30 days.*
- *Remediation and Bulk PCB Waste Storage Area: up to 180 days*

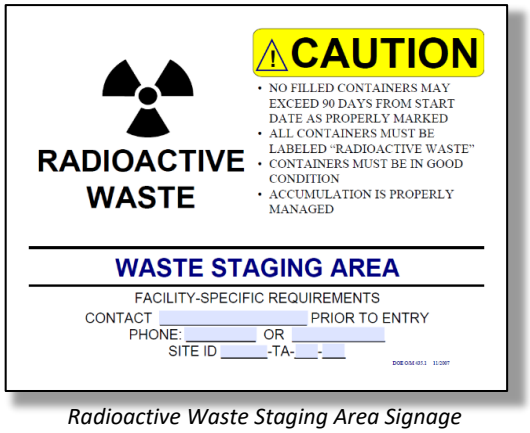
Inspections: Written inspections are required once every 30 days using the PCB Storage Area Inspection Record (IG-P409-0216-Form-001).

Signage: Must have PCB sign posted.

Note: Waste Generators must contact EPC-WMP at wmmanage@lanl.gov as early as possible if it is anticipated that stored PCB waste will exceed the 1-year limit.

Radioactive Waste Staging Area

The Radioactive Waste Staging Area is a registered area for the accumulation of radioactive waste to facilitate transportation, treatment, and/or disposal. Staging must not exceed 90 days. The closed date is the date packaging activities are complete, the waste container is closed, characterized, and a tamper indicating device (TID) is applied.



Radioactive Waste Staging Area Signage

Inspections: Written inspections are required to be performed monthly by the WMC for RSTAs using the Radioactive Waste Staging and Storage Area Monthly Inspection Form (EPC-WMP-FORM-005).

Signage: Must have the words "Radioactive Staging Area" and the Site ID obtained when the site was registered.

Radioactive Waste Storage Area

A Radioactive Waste Storage Area is a registered area where certified waste containers are stored for up to one year, except for wastes with no disposal path.

Radioactive Waste Storage Area Signage

Inspections: Written inspections are required to be performed monthly by the WMC for RSTOs using the Radioactive Waste Staging and Storage Area Monthly Inspection Form (EPC-WMP-FORM-005).

Signage: Must have the words "Radioactive Storage Area" and the Site ID obtained when the site was registered.

Note: Certain accumulation areas can be granted extensions. Contact your WMC for details.

Work closely with your WMC to manage radioactive waste compliantly.

General Container Requirements

The following requirements apply to all of the following accumulation areas: SAAs, CAAs, Universal Waste, used Oil, Radioactive Waste, and New Mexico Special Waste. (Any additional requirements specific to each area will be noted in that area's description below.)

Container Compatibility Requirements:

- ✓ Wastes must be placed in containers that are appropriate for the waste.
- ✓ Containers must be chemically compatible with the waste generated.

Container Condition Requirements:

- ✓ Containers must begin and remain in good condition.
- ✓ Containers must be free of leaks, dents, creases, bulges, or corrosion that would compromise the integrity of the container.

Container Closure Requirements:

- ✓ Containers must be kept closed.
- ✓ Containers must remain closed except when actively adding or removing waste.
- ✓ Containers cannot have any holes, cracks, openings, or gaps between lid and rim.
- ✓ A closed container will not allow any waste to escape into the environment.

Container Labeling Requirements:

- ✓ Labeling must meet federal, state and DOE regulations, LANL internal policy documents.
- ✓ All waste containers must be labeled when waste is first placed in the container.
- ✓ Correct labels must be used.
- ✓ All label fields must be completed.
- ✓ All label entries must be legible and not faded.
- ✓ Labels must be placed on the container that fully encloses the waste.

Additional Container Requirements:

SAAs and CAAs:

Requirement:	SAAs	CAAs
➢ Do not place strong acids/bases in metal containers.	✓	✓
➢ Use distinct containers (i.e., do not place incompatible wastes in the same container; incompatible waste might react, ignite, or explode).	✓	✓
➢ Segregate containers if some waste streams are incompatible with others.	✓	✓
➢ Place liquid waste in rigid closed-top primary containers (e.g., bottles, jugs, or closed head drums).	✓	✓
➢ Provide adequate and unobstructed access to the accumulation area.	✓	✓
➢ Indicate the hazard(s) on the container label.	✓	✓
➢ List the waste constituents (no chemical symbols, abbreviations) on label.	✓	✓
➢ Have a hazard indictor and the words “Hazardous Waste” on the label if the container holds a hazardous waste.	✓	✓
➢ Include the words “Radioactive Waste” and “Hazardous Waste” and a hazard indicator if the container holds mixed waste.	✓	✓
➢ Include the accumulation start date.	NA	✓
➢ Include the start date IF the 55-gallon or 1 quart of acutely hazardous waste limit has been exceeded.	✓	NA
➢ Include the words : “Hazardous Waste.”	NA	✓

Universal Waste Containers:

➢ Include the accumulation start date.

Radioactive Areas:

➢ Include the words “Radioactive Waste” if the container holds low-level waste or TRU waste.

Containers with Unknown Contents

If you find a waste container with unknown contents, do NOT handle the container! Leave the container as is. Examples include waste containers with a missing, incomplete, or illegible label, or a gas cylinder with unknown contents.

Call Emergency Operations: 505-667-2400.

For details regarding specific accumulation area requirements, contact your WMC

Emergency Requirements for SAAs and CAAs

As stated in Module 3, SAAs and CAAs are accumulation areas for hazardous or mixed waste. As part of the mandatory emergency preparedness process, SAA and CAA owners must have an SAA- and CAA-specific contingency plan, and a quick reference guide. Together these documents describe the emergency procedures and hazards. Generators working at SAAs or CAAs must be familiar with the emergency procedures described in the Contingency Plan.

Contingency Plan (CP)

Purpose of the Contingency Plan - The CP describes the actions facility personnel must take in response to fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water.

Content of the Contingency Plan -The CP contains detailed information regarding the following:

- *emergency response to fires, explosions, or release of hazardous waste or hazardous constituents to air, soil, and surface water;*
- *arrangements agreed upon by local police and fire departments, hospitals, federal, state, and local emergency response teams, and tribal governments to coordinate emergency services;*
- *contracts with emergency response contractors and equipment suppliers;*
- *contact information for primary and alternate individual assigned to act as Incident Response Commander; and*
- *an evacuation plan.*

Quick Reference Guide

Purpose of the Quick Reference Guide - While the CP provides the overall emergency response plan for areas where hazardous waste is generated and accumulated, the Quick Reference Guide provides more information that is unique to each SAA and CAA.

The following sections as well as a chart with waste types and a location map for LANL are included in the guide.

- *Facility Contacts:*
  - *Primary Incident Response Commander*
  - *Alternate Incident Response Commanders*
- *On-Site Notification Systems*
- *Waste that May Pose a Unique Threat*
- *Location of Hazardous and/or Mixed Waste*
- *Maximum Quantity of Hazardous Waste*

Required Emergency Equipment and Documentation

The following must always be available:

- *alarms, communication, and spill control equipment*
- *properly maintained safety equipment (eyewashes, safety showers, fire extinguishers, etc.) based on the types of waste stored*
  - *Eyewash Stations/Safety Showers*
    - *must be within 100 feet of SAAs and CAAs*
    - *must be accessible and have no more than one physical door to access*
    - *must not be blocked or obstructed*
    - *must not use stairs/stairwell to access*

Note: See Appendix E, "Eye Wash/Decontamination/Safety Shower Policy LQG/Permitted Facility."

Leaks and Spills: Initial Response Recommendations

Leaks and spills must be cleaned up as soon as is safely possible, and cleaned up material must be managed as the appropriate waste stream. If the spilled material is hazardous or radioactive it must be managed as a hazardous or mixed waste.

Although some spills are small and can be handled by Waste Generators, *most spills are not the Waste Generators' responsibility*. Generators and WMCs must follow established emergency response actions as defined by the facilities where work is conducted.

Cleanup material must be managed as a hazardous or mixed waste.

The Emergency Operations group will coordinate 24-hour emergency response for onsite and offsite incidents involving hazardous materials (e.g., fires, spills, or explosions).

CALL: 505-667-2400

For help responding to emergencies, contact your WMC

Summary

Now that you have completed this course, you should be able to recognize:

- *the importance of waste management at LANL, including the regulations and requirements that affect LANL waste operations;*
- *the waste management process at LANL;*
- *roles and responsibilities of Waste Generators and Waste Management Coordinators, including the liabilities and enforcement of regulations for hazardous waste;*
- *planning, characterization, and documentation of waste;*
- *waste accumulation areas – requirements, container management; and*
- *emergency requirements for Satellite and Central Accumulation Areas, including required emergency equipment and documentation.*

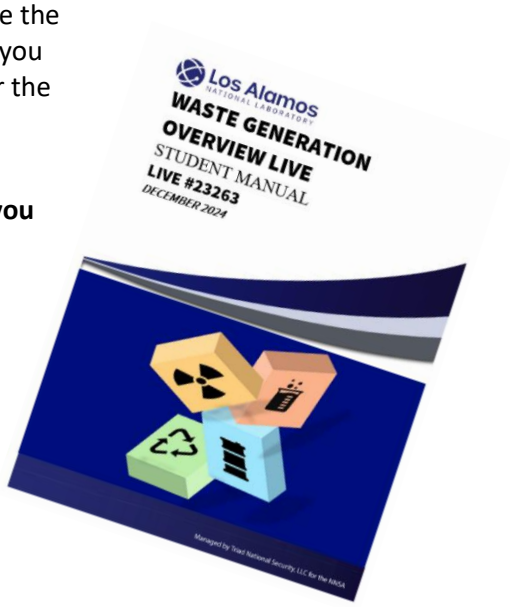
For more resources, go to the Waste Generators Services Group web site:

Go to LANLInside > Environment > Waste > Waste Support > scroll down to Generator Services (WM – WGS).

Next Steps

Now that you have completed this course, continue to UTrain to complete the accompanying quiz, Waste Generation Overview Live Quiz #61067. Once you complete the quiz with a score of 80% or better you will receive credit for the course.

Refer to this Student Manual as a resource as you take the quiz and as you continue to work as a waste generator or waste management coordinator.



Appendix

A

Appendix A - Lessons Learned

Highlands University, Las Vegas, New Mexico

In November 2024, Highlands University faced serious penalties after the New Mexico Environment Department (NMED)/Hazardous Waste Bureau found multiple hazardous waste management violations. Inspectors discovered that chemicals were not properly labeled or stored, employees lacked required training, and there was no solid emergency plan in place. These failures not only violated federal regulations but also presented significant health and safety risks to students, staff, and the surrounding community.

As a result, the university received a substantial fine and was required to make major changes to its hazardous waste procedures. This included implementing proper labeling and storage practices, training employees, and improving emergency response plans. While no illnesses or injuries were directly linked to the violations, the NMED emphasized the potential dangers of mismanaged hazardous materials.

This case underscores the importance of strict safety practices, particularly in high-risk environments like Los Alamos National Laboratory. Proper handling, storage, and disposal of hazardous waste—along with comprehensive training—are essential to protecting workers and the environment. The Highlands University incident highlights the serious consequences of neglecting hazardous waste management and the importance of maintaining high safety standards at all times.

The Love Canal Incident

The Love Canal area in Niagara Falls, New York, was originally the site of an unfinished canal project, later repurposed in the 1940s and 1950s as a dumping ground for nearly 22,000 tons of chemical waste by the Hooker Chemicals and Plastics Corporation. The buried waste included polychlorinated biphenyls (PCBs), dioxins, pesticides, and other hazardous substances. The site was eventually filled in and transferred to the city, which allowed homes and a school to be built directly on and around it.

By 1978, state officials discovered that toxic chemicals were leaking from underground into residential basements. Residents reported black sludge, foul odors, and serious health issues. Investigations revealed abnormally high rates of chromosomal damage, birth defects, miscarriages, and cancer among local families, likely due to long-term chemical exposure.

The state of New York evacuated hundreds of families, purchased and demolished homes, and capped and fenced off the canal. After years of legal battles, Occidental Chemical Corporation (Hooker's successor) and the city of Niagara Falls agreed to a $20 million settlement with 1,300 displaced residents.

The Love Canal tragedy underscores how past practices of unregulated chemical disposal can result in severe, long-term health and environmental crises. Building on or near former industrial sites without proper environmental due diligence can put entire communities at risk.

At the time, there were few laws governing hazardous waste disposal. The Love Canal case highlighted the need for stricter regulations and oversight. Short-term containment of hazardous

waste is not enough. Waste management plans must include long-term risk assessment, monitoring, and secure containment.

The health effects on Love Canal residents demonstrated the cost of prioritizing development over safety. Policies must reflect the primacy of public health.

The eventual settlement and litigation served as a precedent for holding polluters accountable, both legally and financially.

Love Canal directly led to the creation of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)—Superfund—in 1980. This landmark legislation enabled federal response to hazardous waste sites and empowered the EPA to clean up and seek damages from responsible parties.

Times Beach, Missouri

Times Beach was a small town evacuated and later erased due to widespread dioxin contamination. In the early 1970s, the town sprayed its roads with waste oil to manage dust. They unknowingly were using oil contaminated with *dioxin*, a byproduct of Agent Orange production. After the contamination was discovered in 1982, the entire town was evacuated in 1983. The federal government eventually purchased the town, and all properties were condemned and eventually demolished, and the dioxin-contaminated soil was excavated and incinerated. The site of Times Beach is now part of Route 66 State Park.

The Times Beach disaster is a stark example of the dangers of environmental contamination and the potential consequences of improper waste disposal.

*Note: *The articles above are a collaborative work between learning specialist and AI generated material.*

Appendix

B

Appendix B - Hazardous Waste Tables

Quick Reference or Hazardous Waste Codes:

If a waste is	it will have one or more of these EPA Hazardous Waste Numbers,	and this box MUST be checked on the container label:
Ignitable	D001, F003, F005, K108, K171, K172	Ignitable
Corrosive	D002, K107, K124, K131	Corrosive
Reactive	D003, F007–F011, K011, K013, K027, K111, K161, K062	Reactive
Toxic	D004–D043, any U-code, F001, F002, F004–F012, F019, F024, F025, F028, F032–F039, K001–K132	Toxic
Acutely Toxic	Any P-code, F020–F023, F026, F027	Toxic

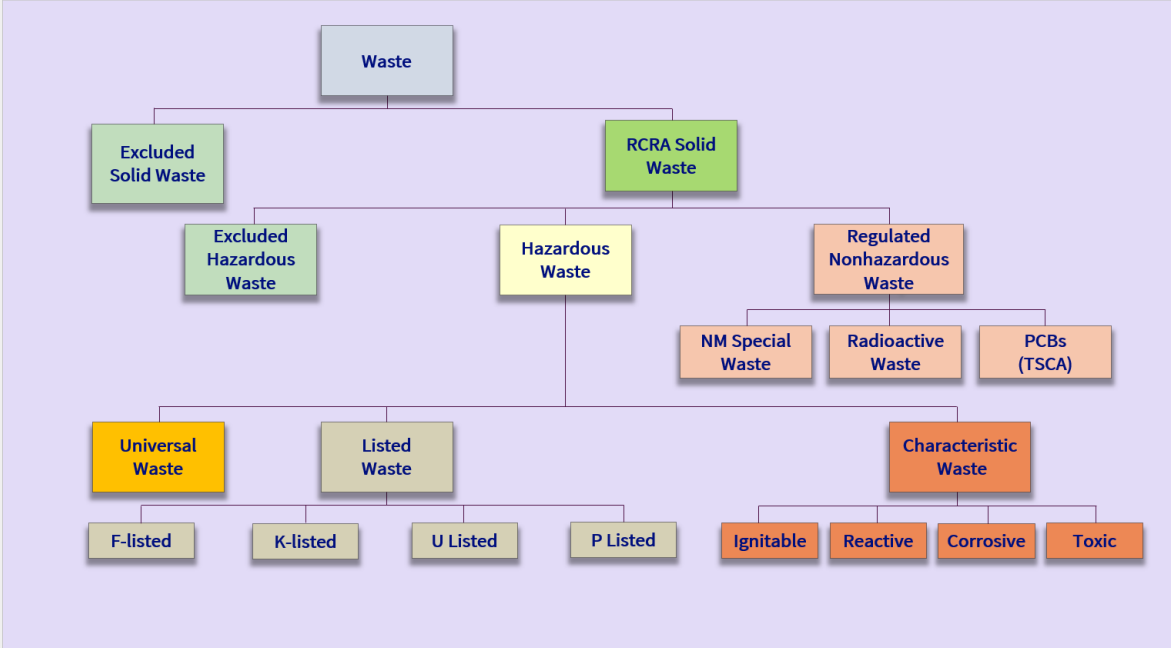


Table	Title
1	Types of Characteristic Wastes
2	Characteristic Wastes – Toxicity
3	Types of Listed Waste
4	Listed Waste EPA Codes
5	Listed Waste Hazard Codes
6	F-Listed Wastes
7	K-Listed Wastes
8	P-Listed Wastes
9	U-Listed Wastes

Characteristic Waste

The Environmental Protection Agency (EPA) developed two main approaches for designating a solid waste as hazardous. First, the agency identified four generic physical/chemical properties that, if exhibited by a solid waste, make it a hazard to human health or the environment. Such wastes are known as “characteristic” hazardous wastes. The four hazardous characteristics are ignitability (D001), corrosivity (D002), reactivity (D003), and toxicity (D004 through D043).

Table 1: Types of Characteristic Waste

Waste type	Description
Ignitable D001	• a liquid other than an aqueous solution containing less than 24% alcohol by volume and has a flash point lower than 60°C (140°F) • not a liquid and is capable, under standard temperature and pressure (STP), of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard • flammable compressed gas as defined by the DOT • DOT oxidizer
Corrosive D002	• pH of ≤2.0 or ≥12.5 OR • a liquid that corrodes steel at a rate >0.25 in. (6.35 mm) per year at a test temperature of 55°C
Reactive D003	• normally unstable and readily undergoes violent change without detonating • reacts violently when mixed with water or generates toxic gases, vapors, or fumes • forms potentially explosive mixtures when mixed with water • cyanide- or sulfide-bearing waste that can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment when exposed to pH conditions between 2.0 and 12.5 • capable of detonation or explosive reaction if subjected to a strong initiating source or if heated under confinement • readily capable of detonation at STP • DOT Division 1.1, 1.2, or 1.3 explosive
Toxic D004–D043	meets or exceeds the maximum toxic concentration limits that are based on the toxicity characteristic leaching procedure (TCLP) test

Regulated characteristic toxic wastes are identified in Table 2, shown on the following page.

The **Chemical Abstracts Service Number** (CAS #) is a unique chemical identification number recognized around the World. CAS #s are found in Tables 1, 7, and 8.

Table 2: Maximum Concentration of Contaminants for the "Toxicity" Characteristic as Determined by the TCLP ("D" List)

Haz. Waste #	Constituent	CAS #	Regulatory level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D0018	Benzene	71-43-2	0.5
D006	Cadmium	7440-43-9	1.0
D019	Carbon tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D007	Chromium	7440-47-3	5.0
D023	o-Cresol	95-48-7	200.0**
D024	m-Cresol	108-39-4	200.0**
D025	p-Cresol	106-44-5	200.0**
D026	Cresol		200.0**
D016	2,4-D	94-75-7	10.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	0.13*
D012	Endrin	72-20-8	0.02
D031	Heptachlor	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	0.13*
D033	Hexachlorobutadiene	87-68-3	0.5
D034	Hexachloroethane	67-72-1	3.0
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D035	Methyl ethyl ketone	78-93-3	200.0
D036	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0*
D010	Selenium	7782-49-2	1.0
D011	Silver	7740-22-4	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D015	Toxaphene	8001-35-2	0.5
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D017	2,4,5-TP (Silvex)	93-72-1	1.0
D043	Vinyl Chloride	74-01-4	0.2

* Quantitation limit is greater than the calculated regulatory level. The quantitative limit therefore becomes the regulatory level.

** 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 (mg/L).

Listed Wastes

The second approach used by the EPA for defining a hazardous waste was to make lists of specific waste streams or chemicals that the EPA knew from experience presented a threat to human health or the environment when disposed of. The four lists identified by the EPA (F, K, P, and U) are described in Table 3. Each waste code incorporates the letter designation for each list. Table 4 lists the hazard code definitions, which are the basis for listing the classes or types of listed wastes.

Table 3: Types of Listed Waste

Waste Type	Description	Examples
F-listed	non-industry-specific/process-specific waste stream	spent solvents from electroplating operations
K-listed	industry-specific/non-process-specific waste stream	waste generated from the manufacturing of explosives
F and K codes may be used only if the source of the waste is known.		
U-listed	discarded commercial chemical products	benzene (U019)
P-listed	acutely hazardous, discarded commercial chemical products	beryllium powder (P015)
P and U codes are to be used for pure and unused compounds only. In a mixture, the P and U codes may be used only if the compound is the sole active ingredient.		

Table 4: Listed Waste EPA Codes	
EPA List*	**Definition**
F-Listed[a] (see Table 5)	Hazardous wastes from nonspecific or generic sources/processes. There are 28 F-listed wastes currently identified, having waste codes ranging from F001 through F039 (some gaps exist in the numbering system). (40 CFR 261.31)
K-Listed[a] (see Table 6)	The K list includes manufacturing process wastes from specific industries/sources. The list is subdivided into wastes generated from specific industrial categories. (40 CFR 261.32)
P-Listed[b] (see Table 7)	The P list identifies discarded commercial chemical products that are acutely hazardous. The P chemicals possess "extremely hazardous properties" that make them lethal in very small quantities. (40 CFR 261.33)
U-Listed[b] (see Table 8)	The U list identifies discarded commercial chemical products that have various factors that could render a waste "toxic" but do not meet the acutely hazardous definition for P-listed wastes. (40 CFR 261.33)
*F and K waste numbers can be used only if the source of the waste is known. P and U waste numbers are to be used for pure and unused compounds only. In a mixture, the P and U codes can be used only if the compound is the sole active ingredient.	

• **Table 5: Listed Waste Hazard Codes**	
• Ignitable Waste	• (I)
• Corrosive Waste	• (C)
• Reactive Waste	(R)
• Toxicity Characteristic Waste	(E)
• Acute Hazardous Waste	(H)
• Toxic Waste	(T)
• Note: For P- and U-listed wastes, the hazard code follows the substance name. <u>The absence of a hazard code indicates that the compound is listed for acute toxicity.</u>	

F and K waste numbers can be used ONLY if the source of the waste is known.

Table 6: Hazardous Waste Generated by Generic Processes (F Listed) (40 CFR 261.31)

F

This table is a truncated table for training use only.
There are many other F Listed Hazardous Wastes.

Industry and EPA Haz. waste #	Hazardous Waste	Hazard Code
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(T)
F002	The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(T)
F003	The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of 10% or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(I)
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(T)
F005	The following spent non-halogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(I, T)
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc, and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum	(T)
F007	Spent cyanide plating bath solutions from electroplating operations	(R, T)
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process	(R, T)
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process	(R, T)

Table 7: Hazardous Wastes from Specific Sources (K Listed) (40 CFR 261.32)

This table is a truncated table for training use only. There are many other K Listed Hazardous Wastes.

K

Industry and EPA Haz. Waste #	Hazardous Waste	Hazard Code
	Inorganic pigments	
K003	Wastewater treatment sludge from the production of molybdate orange pigments	(T)
K004	Wastewater treatment sludge from the production of zinc yellow pigments	(T)
	Organic chemicals	
K010	Distillation side cuts from the production of acetaldehyde from ethylene	(T)
K011	Bottom stream from the wastewater stripper in the production of acrylonitrile	(R, T)
K027	Centrifuge and distillation residues from toluene diisocyanate production	(R, T)
K028	Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane	(T)
K029	Waste from the product steam stripper in the production of 1,1,1-trichloroethane	(T)
K030	Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene	(T)
K095	Distillation bottoms from the production of 1,1,1-trichloroethane	(T)
K111	Product wash waters from the production of dinitrotoluene via nitration of toluene	(C, T)
K118	Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene	(T)
	Inorganic chemicals	
K106	Wastewater treatment sludge from the mercury cell process in chlorine production	(T)
K176	Baghouse filters from the production of antimony oxide, including filters from the production of intermediates (e.g., antimony metal or crude antimony oxide)	(E)
	Explosives	
K044	Wastewater treatment sludges from the manufacturing and processing of explosives	(R)
K045	Spent carbon from the treatment of wastewater containing explosives	(R)
K046	Wastewater treatment sludges from the manufacturing, formulation, and loading of lead-based initiating compounds	(T)

Key: T = toxicity; R = reactivity; I = ignitability; C = corrosivity. Absence of a letter indicates that the compound is listed only for toxicity.

Table 8: Acutely Hazardous Discarded Commercial Chemical Products (P Listed) (40 CFR 261.33)

This table is a truncated table for training use only. There are many other P Listed Hazardous Wastes.

P

Haz. Waste #	CAS#	Substance
P023	107–20–0	Acetaldehyde, chloro-
P009	131–74–8	Ammonium picrate (R)
P011	1303–28–2	Arsenic pentoxide
P012	1327–53–3	Arsenic trioxide
P028	100–44–7	Benzyl chloride
P015	7440–41–7	Beryllium powder
P017	598–31–2	Bromoacetone
P127	1563–66–2	Carbofuran
P022	75–15–0	Carbon disulfide
P056	7782–41–4	Fluorine
P057	640–19–7	Fluoroacetamide
P059	76–44–8	Heptachlor
P068	60–34–4	Hydrazine, methyl-
P063	74–90–8	Hydrocyanic acid
P065	628–86–4	Mercury fulminate (R,T)
P068	60–34–4	Methyl hydrazine
P064	624–83–9	Methyl isocyanate
P077	100–01–6	p-Nitroaniline
P076	10102–43–9	Nitrogen oxide NO
P078	10102–44–0	Nitrogen oxide NO2
P087	20816–12–0	Osmium tetroxide
P048	51–28–5	Phenol, 2,4-dinitro-
P096	7803–51–2	Phosphine
P104	506–64–9	Silver cyanide
P105	26628–22–8	Sodium azide
P106	143–33–9	Sodium cyanide
P120	1314–62–1	Vanadium pentoxide
P121	557–21–1	Zinc cyanide

P waste numbers are ONLY used for pure and unused compounds. In a mixture, P waste numbers can be used ONLY if the compound is the sole active ingredient.

Key: T = toxicity; R = reactivity; I = ignitability; C = corrosivity. Absence of a letter indicates that the compound is listed only for toxicity.

Table 9: Discarded Commercial Chemical Products (U Listed) (40 CFR 261.33)

U

This table is a truncated table for training use only. There are many other U Listed Hazardous Wastes.

Haz. Waste #	CAS#	Substance
U001	75–07–0	Acetaldehyde (I)
U034	75–87–6	Acetaldehyde, trichloro-
U002	67–64–1	Acetone (I)
U003	75–05–8	Acetonitrile (I,T)
U004	98–86–2	Acetophenone
U006	75–36–5	Acetyl chloride (C,R,T)
U019	71–43–2	Benzene (I,T)
U037	108–90–7	Benzene, chloro-
U070	95–50–1	Benzene, 1,2-dichloro-
U071	541–73–1	Benzene, 1,3-dichloro-
U072	106–46–7	Benzene, 1,4-dichloro-
U225	75–25–2	Bromoform
U031	71–36–3	1-Butanol (I)
U159	78–93–3	2-Butanone (I,T)
U160	1338–23–4	2-Butanone, peroxide (R,T)
U044	67–66–3	Chloroform
U056	110–82–7	Cyclohexane (I)
U057	108–94–1	Cyclohexanone (I)
U078	75–35–4	1,1-Dichloroethylene
U079	156–60–5	1,2-Dichloroethylene
U025	111–44–4	Dichloroethyl ether
U081	120–83–2	2,4-Dichlorophenol
U082	87–65–0	2,6-Dichlorophenol
U068	74–95–3	Methylene bromide
U080	75–09–2	Methylene chloride
U159	78–93–3	Methyl ethyl ketone (MEK) (I,T)
U160	1338–23–4	Methyl ethyl ketone peroxide (R,T)
U226	71–55–6	1,1,1-Trichloroethane
U227	79–00–5	1,1,2-Trichloroethane
U228	79–01–6	Trichloroethylene

Key: T = toxicity; R = reactivity; I = ignitability; C = corrosivity. Absence of a letter indicates that the compound is listed only for toxicity.

U waste numbers are ONLY used for pure and unused compounds. In a mixture, U waste numbers can be used ONLY if the compound is the sole active ingredient.

Appendix

C

Appendix C - Incompatibility Table

Attachment 8 – Incompatibility Table

DOT Hazard Class or Division	Explosives	Flam Gases	Non-flammable gases	Toxic Gases	Flammable Liquids	Flammable Solids*	Spontaneously Combustible Materials	Dangerous When Wet**	Oxidizers	Organic Peroxides	Toxic Liquids	Radioactive Materials	Acids	Bases (Alkaline)
Explosives		X	X	X	X	X	X	X	X	X	X	X	X	X
Flammable Gases	X			X					X	X	X	X		
Non-Toxic or Non-Flammable Gases	X													
Toxic Gases	X	X			X	X	X	X	X	X			X	X
Flammable Liquids	X			X				X	X	X	X		X	
Flammable Solids*	X			X				X	X	X	X		X	X
Spontaneous Combustible Materials	X			X					X	X	X		X	X
Dangerous When Wet**	X			X	X	X					X		X	X
Oxidizers	X	X		X	X						X		X	X
Organic Peroxides	X	X		X							X		X	X
Toxic Liquids	X	X			X	X	X	X	X	X			X	X
Radioactive Materials	X	X												
Acids	X			X		X	X	X	X	X	X			X
Bases	X			X		X	X	X	X	X	X		X	
Non-hazardous Organic Materials						X			X	X			X	X

X –Indicates incompatibility, never mix any of the indicated chemicals with other chemicals. Fire, excessive heat, toxic fumes, or toxic gases may be generated.

*Flammable Solids include, but are not limited to, reactive metals and metal hydrides.

**Dangerous When Wet materials include, but are not limited to, cyanide and sulfide bearing materials.

Sources:
49 CFR §177.848
40 CFR Part 264, Appendix V

Appendix

D

Appendix D - Accumulation Areas – Requirements and Limitations

SATELLITE ACCUMULATION AREA REQUIREMENTS AND LIMITATIONS
Satellite Accumulation Area (SAA): An accumulation area for hazardous or mixed waste located at or near where waste is generated that can store 55 gallons or less.
Location Requirements
• Must be protectively and actively controlled and managed by generators to prevent unauthorized access; SAA outside must be locked. • Must register area with the EPC-WMP at epc.lanl.gov. • Located to serve an active process that generates waste. • Must be located in a distinct location in the same room where waste is generated and at or near the point of generation. • Must have a minimum of 2 feet of aisle space for emergency response access. • Hazardous waste must be placed in the SAA upon generation. • Hazardous waste cannot be moved from one SAA to another SAA, even if they are in the same room.
Volume Limits
• For non-acute hazardous waste, the volume of waste may not exceed 55 gallons. • For acute hazardous waste, the volume of waste may not exceed 1 quart for liquids or 1 kg for solids.
Time Constraints
• When a volume limit is reached, the waste must be transferred to a CAA, permitted hazardous waste storage unit, or offsite treatment, storage, and disposal facility (TSDF) within 3 calendar days. The date on which the volume limit was exceeded should be clearly marked on the container as the ASD. • When a waste container is approaching a volume limit, the assigned WMC should be notified so that waste transfer actions can be completed swiftly once the volume limit is reached. If the assigned WMC is unknown, email WMC-Help@lanl.gov for assistance.
Labeling Requirements
Containers must be clearly labeled with the following: • "Hazardous Waste" • "Radioactive" if holding mixed waste • List of major constituents (no chemical formulas, abbreviations, or EPA codes) • Indication of all hazards associated with the waste (i.e., ignitable, corrosive, reactive, and/or toxic) • Generator name As a best management practice, containers should also be labeled with the corresponding waste stream profile number.
Container Requirements
• Must remain closed except when adding or removing waste or when temporary venting is necessary to ensure proper operation of the equipment or to prevent dangerous situations. • Containers must be compatible with the waste. • Incompatible wastes must be segregated. • Containers with water-reactive waste must be stored such that they cannot be exposed to water (water fire suppression). • Daily accumulation containers must follow labeling requirements and must be moved to registered SAA at the end of the day/shift/process. • Must be associated with an active process.

Satellite Accumulation Area Requirements (cont.)
Emergency Equipment Requirements
SAAs must have emergency equipment available in case of an emergency. The following safety equipment is required for the types of hazards posed at each site (as applicable): ○ Communications equipment ○ Internal communications or alarms ○ Telephone or 2-way handheld radio ○ Fire suppression equipment ○ Portable fire extinguishers ○ Adequate water for hoses, foam producing equipment, sprinklers, or spray systems ○ Fire hydrants ○ Decontamination equipment ○ Safety showers and/or eyewashes (Must be within 100 feet of the SAA.) ○ Spill-control supplies ○ Spill control supplies are always required and must be specific to the types of waste stored. Must have emergency procedures in place and generators at each SAA. • Must have immediate access to emergency equipment and documentation. • Must have properly maintained safety equipment (eyewashes, safety showers, fire extinguishers, etc.) based on the types of waste stored. NOTE: Industrial Safety/Health (ISH) personnel can determine if onsite safety equipment is needed. If safety equipment is not needed, documentation is required.
Documentation Requirements
Daily accumulation containers must be documented in a procedure or integrated work document or maintained in an accumulation log. Must have emergency and site-specific plan. Must have quick reference guide and contingency plan at the area or building.
Inspection Requirements
No inspection requirements apply to SAAs; however, as a best management practice, it is recommended to assess SAAs at least monthly for container integrity and general storage area compliance.
Signs/Postings Requirements
• Hazardous Waste - Satellite Accumulation Area (SAA) (Form FSD-P409-0600-Form-003) must be posted. • *Authorized Users for Satellite Accumulation Area (SAA)* (Form FSD-P409-0600-Form-001) must be posted with the current list of authorized SAA users, and the SAA owner must be an active user.

CENTRAL ACCUMULATION AREA REQUIREMENTS AND LIMITATIONS
Central Accumulation Area (CAA): An accumulation area where hazardous or mixed waste may be stored for up to 90 days without a permit.
Location Requirements
• Must register area with the EPC-WMP at epc.lanl.gov. • Established if area is not located at/near the point of generation, or if generators intend to accumulate more than the allowable SAA limits. • Minimum 2 feet of aisle space for emergency response access. • Hazardous waste in a CAA may be accumulated away from the point of generation.
Volume Limits
None.
Time Constraints
• Waste may be stored up to 90 days. • A 30-day extension may be granted by NMED if needed due to unforeseen, temporary, and uncontrollable circumstances. NOTE: Requires a written justification submitted by day 70 to EPC-WMP at wmmanage@lanl.gov.
Labeling Requirements
Label must have: ➢ "Hazardous Waste" ➢ "Radioactive" if holding mixed waste ➢ List of major constituents (no chemical formulas, abbreviations, or EPA codes) ➢ Indication of all hazards associated with the waste (i.e., ignitable, corrosive, reactive, and/or toxic) ➢ Accumulation Start Date (ASD)
Container Requirements
• Containers must remain closed except when adding, removing or consolidating waste. • Containers must be compatible with the waste. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material. • Containers with water-reactive waste must be stored such that they cannot be exposed to water (water fire suppression). Containers with a concentration of volatile organic compounds (VOCs) greater than 500 ppm by weight must be monitored for emissions unless they meet DOT. specifications under 49 CFR part 178 or fall under the exclusions in 40 CFR 265.1080.
Emergency Equipment Requirements
CAAs must have emergency equipment available in case of an emergency. The following safety equipment is required for the types of hazards posed at each site (as applicable): • Communications equipment • Internal communications or alarms • Telephone or 2-way handheld radio • Fire suppression equipment • Portable fire extinguishers • Adequate water for hoses, foam producing equipment, sprinklers, or spray systems • Fire Hydrants • Decontamination equipment • Safety showers and/or eyewashes • Spill-control supplies • Spill control supplies are always required and must be specific to the types of waste stored. NOTE: Industrial Hygiene/Safety (ISH) personnel can determine if onsite safety equipment is needed. If safety equipment is not needed, documentation is required.

CENTRAL ACCUMULATION AREA REQUIREMENTS AND LIMITATIONS (CONT.)
Documentation Requirements
• Must have emergency and site-specific plan. • Must have quick reference guide and contingency plan at the area or building.
Inspection Requirements
Written inspections are required weekly using the CAA Inspection Record. For instructions on filling out the CAA Inspection Record, refer to the Instruction for Use of the Inspection Record for Central Accumulation Areas.
Signs/Postings Requirements
Hazardous Waste – Central Accumulation Area (Form FSD-P409-0600-Form-002) must be posted.

UNIVERSAL WASTE AREA REQUIREMENTS AND LIMITATIONS
Universal Waste Area (UWA): An area that is dedicated to specific hazardous waste types that are subject to universal waste requirements and includes certain types of batteries, pesticides, mercury containing equipment, lamps, and aerosol cans.
Location Requirements
Must register area with the EPC-WMP at epc.lanl.gov.
Volume Limits
None.
Time Constraints
Waste may be stored up to one (1) year.
Labeling Requirements
Label must include the words ➢ "Universal Waste" and type of waste: batteries, aerosol cans, lamps/bulbs, mercury containing equipment, or recalled pesticides; ➢ accumulation start date.
Container Requirements
• Containers must remain closed except when waste is being added, removed or consolidated/nozzle . • Aerosol cans must have the actuator/nozzle removed before being placed into storage.
Inspection Requirements
Not required.
Signs/Postings
Signs must have the words "Universal Waste Area."

USED OIL AREA REQUIREMENTS AND LIMITATIONS
Used Oil Area: An area dedicated for the storage of used oil intended for recycle. Used oil means "any oil that has been refined from crude oil, or any synthetic oil that has been used and as a result of such use is contaminated by physical or chemical impurities [40 CFR 279.1]."
Location Requirements
Must register with the EPC-WMP if more than 10 gal. is accumulated in a single location.
Volume Limits
Register site if storing more than 10 gal.
Time Constraints
As a best management practice, used oil should not be stored for longer than 1 year.
Labeling Requirements
Label must include the words "Used Oil," regardless of the quantity.
Container Requirements
• Containers must remain closed except when waste is being added, removed or consolidated/nozzle. • Containers must be in good condition (no severe rusting, apparent structural defects, or deterioration). • Containers must not be leaking (no visible leaks).
Inspection Requirements
Not required.
Signs/Postings Requirements
Not required.

NEW MEXICO SPECIAL WASTE STORAGE AREA REQUIREMENTS AND LIMITATIONS
New Mexico Special Waste Storage Area: An area for solid wastes with unique handling, transportation, or disposal requirements to ensure the protection of the environment and the health, welfare, and safety of the public.
Location Requirements:
Must register with the EPC-WMP.
Volume Limits
None.
Time Constraints
Time limits for NMSW storage are based on the closed date. The closed date refers to the date on which a waste container is deemed full and placed into storage. ➢ Waste may be stored up to 90 days from the closed date. ➢ For infectious waste, no person other than the generator shall store waste for more than 7 days without refrigeration (at or below 45 degrees Fahrenheit).
Labeling
• Label must include: o the words “New Mexico Special Waste”; o a list of the container contents; o a list of potential ESH hazards associated with the waste; o the name of the generator; o the closed date and characterization if petroleum-contaminated soil; • Containers holding asbestos waste must also be labeled in both English and Spanish, “DANGER, contains asbestos fibers, may cause cancer, caused damage to lungs, do not breath dust, avoid creating dust.” • Bags holding infections waste must also be labeled “biohazard” or “biological hazard” or have the biohazard symbol. • Rigid containers holding infectious waste must also be labeled biomedical or infectious waste or the same manner as bags. *Note: There may be additional container requirements for NMSWs depending on the type of waste (for example: asbestos, unbound nano-materials).
Containers
Containers must remain closed except when waste is being added, removed, or consolidated.
Inspections
No inspection requirements are established for NMSW storage areas; however, as a best management practice, it is recommended to assess NMSW storage areas at least monthly for container integrity and general storage area compliance.
Signs/Postings
Signs must have the words “New Mexico Special Waste.”

PCB STORAGE AREA REQUIREMENTS AND LIMITATIONS
PCB (Polychlorinated Biphenyl) Storage Areas: A location for the storage of items contaminated with PCBs.
Location Requirements:
• Must register with the EPC-WMP except for the 30-day temporary storage area. • PCB general storage areas must have secondary containment.
Volume Limits
None.
Time Constraints
• PCB **temporary** waste storage area, waste can be stored up to **30 days**. • PCB **general** storage area, waste can be stored up to **one year**. • PCB **remediation and PCB bulk product** waste, waste can be stored up to **180 days** Note: PCB contaminated fluorescent light ballast are regulated as PCB bulk product waste.
Labeling
• PCB larger label • "Hazardous Waste" if the waste is hazardous • PCB identification number, except for small PCB capacitors and fluorescent light ballasts • Out of Service Date (OSD) marked on the outermost container
Containers
• Containers must be lined and must remain closed except when waste is being added, removed, or consolidated. • Temporary PCB storage areas must have a spill prevention, control, and countermeasures plan for PCB items with 50 ppm or greater PCB liquids.
Inspections
General PCB Storage Areas: Written inspections are required once every 30 days using the PCB Storage Area Inspection Record (IG-P409-0216-Form-001). Temporary PCB Storage Areas: There are no inspection requirements for temporary PCB waste storage areas as waste can only be stored in these areas for up to 30 days (FSD-P409-0600).
Signs/Postings
Signs must have a PCB label.

See FSD-P409-0600, Waste Accumulation and Storage, Section, 4.3 for the additional requirements.

RADIOACTIVE WASTE STAGING AREA (RSTA) & RADIOACTIVE WASTE STORAGE AREA (RSTO) REQUIREMENTS AND LIMITATIONS
Radioactive Waste Staging Area: The accumulation of radioactive waste in a registered area to facilitate transportation, treatment, and/or disposal. The staging start date begins when the final container for the waste has been filled and sealed, if performed in a timely manner. Staging must not exceed 90 days. **Radioactive Waste Storage Area – A registered area where certified waste containers are stored for up to 1 year, except for wastes with no disposal path.**
Location Requirements
Must register area with the EPC-WMP. ➢ Staging and storage area must be evaluated by an RCT. ➢ Waste must be staged in a location and manner that meets As Low As Reasonably Achievable (ALARA) requirements and minimizes worker exposure. ➢ Mixed low-level waste (MLLW)/ mixed TRU waste (MTRU) NOT allowed.
Volume Limits
Staging and Storage areas must stay with Material at Risk (MAR) limits of the facility.
Time Constraints
• Radioactive staging area – up to 90 days from the closed date. • Radioactive storage area – up to one year from the closed date. Note: If storage of LLW must exceed one year (TRU waste are not subject to the one-year limit or Radioactive Waste Management Basis (RWMB) extension), the facility must submit a revised RWMB Form 2107 to request a storage extension for the waste at least 90 days before reaching the one-year limit.
Labeling Requirements
Containers must include: ➢ the words “Radioactive waste”; ➢ the Container Identification number; ➢ the Waste Stream Profile (WSP) number; ➢ the closed date if filled and sealed; ➢ the word “Empty” if empty. See FSD-P409-0601, *Radioactive Waste Management Basis Submittal Process* for more info.
Containers
➢ Must remain closed except when waste is being added, removed, or consolidated. ➢ Containers that are filled and sealed must be affixed with a tamper indicating device (TID) and meet torquing/closure requirements to ensure there is no tampering with waste that has been certified by the Waste Certifying Official (WCO).
Inspections
Written inspections required monthly using the Radioactive Waste Staging and Storage Area Monthly Inspection Form (EPC-WMP-FORM-005).
Signs/Postings
Signs that indicate the following must be posted in the RSTA: ➢ “Radioactive Waste Staging Area” OR “Radioactive Waste Storage Area” respectively ➢ Site ID number obtained when the site was registered

Appendix

E

Appendix E - Eye Wash/Decontamination/Safety Shower Policy LQG/Permitted Facility

Eye Wash/Decontamination/Safety Shower Policy LQG/Permitted Facility

1. All eye wash stations/safety showers must be within 100 feet of the satellite accumulation area and must not be breached/accessible within more than one threshold/door access to retrieve.

2. The eye wash station/safety shower must be easily accessible by standing and not having to crouch/bend or reach beneath a cabinet or other infrastructure to gain access to unit. If the eye wash station is in a cabinet/locker it must be clearly labeled with large text "Eyewash/Safety Shower/Spill Kit".

3. If the eye wash/safety shower is in a remote/rural area. The eye wash/spill kit must be kept in an appropriate container that will prevent freezing of safety material. The container must be clearly labeled with the large text "Eye Wash/Safety Shower" and must not be expired, and routinely inspected per appropriate regulation.

4. All Eye Wash/Safety Shower stations must be easily accessible and not blocked/obstructed and must not be traversed by utilizing a stairwell/staircase or stairs. Appropriate aisle spacing regulations must be adhered to.

5. If Eye Wash/Safety Shower is in a detached building, shed, Conex, or other infrastructure, specifically containing a Central Accumulation Area ("CAA") all Central Accumulation Area regulations must be followed. If located within a permitted area all permitted site-specific regulations must be followed according to permit specifications. If not within a permitted area all requirements must follow 40 CFR 262 subpart M, or the above-mentioned standards.

6. All Eye Wash Station/Safety Showers/Spill Kits must be determined to defend the appropriate waste stream and hazardous waste accumulated at the area of generation.

7. If the above standards cannot be met or complied with by the facility once the appropriate facility has received written notice by NMED-HWB of the above standards, then the facility must give written notice within 30 days to NMED-HWB justifying the need for variance and show cause of the above-mentioned non-compliance inabilities. NMED will review the requested variance and render a decision for site specific adjustments by approval or denial within 60 days.

8. All other ANSI Z358 regulations and NFPA 472 standards still apply to the appropriate occupational facilities inspected by NMED-HWB.

Appendix

F

Appendix F - Regulatory Drivers – Descriptions*

**Information in Appendix F was developed with the assistance of AI.*

Regulatory Drivers – Federal

Resource Conservation and Recovery Act (RCRA)

The Resource Conservation and Recovery Act (RCRA) was enacted by Congress in 1976 as an amendment to the Solid Waste Disposal Act of 1965, in response to growing concerns over the management of hazardous and non-hazardous waste. The law was designed to address the mounting volume of waste generated by industrial and municipal sources and to ensure that waste is managed in a manner that protects human health and the environment.

RCRA provides the U.S. Environmental Protection Agency (EPA) with the authority to regulate the generation, transportation, treatment, storage, and disposal of solid and hazardous waste. It marked a major shift in federal waste policy from open dumping and uncontrolled landfilling to a comprehensive "cradle-to-grave" approach, ensuring that hazardous waste is tracked and managed throughout its lifecycle.

Key Elements of RCRA - RCRA is organized into several subtitles, the most relevant of which are:

Subtitle C – Hazardous Waste Management:
This subtitle establishes a system for controlling hazardous waste from its generation to disposal. It defines what constitutes hazardous waste and sets standards for generators, transporters, and treatment, storage, and disposal facilities (TSDs). Entities must obtain permits and comply with strict recordkeeping, reporting, and operational requirements.

Subtitle D – Non-Hazardous Solid Waste:
This section provides guidance and requirements for the management of non-hazardous solid waste, primarily through state and local governments. It includes criteria for the design and operation of municipal solid waste landfills and promotes source reduction and recycling programs.

Subtitle I – Underground Storage Tanks (USTs):
Regulates tanks that store petroleum or certain hazardous substances underground, with the goal of preventing leaks and protecting groundwater.

RCRA's "Cradle-to-Grave" System

RCRA's most significant innovation is its "cradle-to-grave" management system for hazardous waste. This system requires:

Identification of hazardous waste using specific criteria and listings.

Tracking waste through manifests from the point of generation through transportation to its final treatment or disposal.

Permitting and inspection of facilities that treat, store, or dispose of hazardous waste.

Recordkeeping and reporting by generators and facilities to document compliance and provide transparency.

Generator Classifications - RCRA classifies hazardous Waste Generators based on the amount of waste produced in a calendar month:

- Very Small Quantity Generators (VSQGs): ≤100 kg of hazardous waste/month.
- Small Quantity Generators (SQGs): 100–1,000 kg/month.
- Large Quantity Generators (LQGs): >1,000 kg/month or >1 kg of acutely hazardous waste.

Each category has specific requirements for storage, labeling, training, emergency preparedness, and reporting.

Implications for National Laboratories - At a national laboratory, compliance with RCRA is essential due to the generation of both hazardous and non-hazardous wastes in research, analytical, and maintenance operations. Laboratories typically fall into the LQG category and must:

- Ensure all personnel handling waste are properly trained.
- Maintain accurate waste characterization and labeling.
- Use EPA-approved containers and storage practices.
- Submit biennial reports and manage emergency response plans.

RCRA and Corrective Action

RCRA also authorizes EPA and state agencies to require corrective action at facilities where waste has been mismanaged. This includes cleanup of soil, groundwater, or surface water contamination. Corrective action can be required as a condition of a facility's permit or through enforcement actions.

State Authorization

While RCRA is a federal law, it allows states to implement their own hazardous waste programs if they are at least as stringent as federal requirements. Most states have been authorized by EPA to operate RCRA programs, often with additional or more specific requirements.

Hazardous and Solid Waste Amendments (HSWAs)

The **Hazardous and Solid Waste Amendments (HSWAs)** were signed into law in 1984 as the most significant revision to the Resource Conservation and Recovery Act (RCRA) since its original passage in 1976. Prompted by public concern over ongoing environmental contamination and perceived regulatory gaps, HSWAs were enacted to strengthen RCRA's regulatory framework and close loopholes in hazardous waste management.

The amendments greatly expanded the EPA's authority, increased the stringency of hazardous waste regulations, and emphasized long-term environmental protection over short-term disposal solutions.

Major Goals of HSWAs

The HSWAs were driven by the need to:

- Reduce the generation of hazardous waste.
- Minimize the reliance on land disposal.
- Ensure corrective action at contaminated sites.
- Increase regulatory oversight of previously exempt or under-regulated activities.

Key Provisions of HSWAs

1. Land Disposal Restrictions (LDRs)

HSWAs introduced the Land Disposal Restrictions (LDR) program, which prohibits the disposal of hazardous waste on or in the land unless it has been treated to reduce its toxicity or mobility. The goal is to prevent the migration of hazardous constituents into groundwater or the environment.

Certain hazardous wastes must meet specific treatment standards before land disposal. Wastes that do not meet the standards are prohibited from land disposal. Dilution is not an acceptable substitute for treatment.

2. Corrective Action Requirements

HSWAs granted EPA the authority to require corrective action for releases of hazardous waste or hazardous constituents from solid waste management units (SWMUs) at treatment, storage, or disposal facilities (TSDs), regardless of whether the units were subject to current permit conditions.

3. Expansion of Regulated Wastes and Activities

Small Quantity Generators (SQGs): HSWAs added specific requirements for SQGs to bridge gaps in oversight of Waste Generators below LQG thresholds.

Used Oil and Other Wastes: The amendments expanded the scope of regulated materials to include used oil, household hazardous waste, and certain military and mixed radioactive wastes.

Underground Storage Tanks (USTs): HSWAs also strengthened controls on USTs to prevent leaks and required tank owners to meet stricter design, installation, and monitoring standards.

4. Increased Enforcement and Deadlines

HSWAs established enforceable deadlines for the issuance of RCRA permits and for the closure of unpermitted hazardous waste facilities. Facilities operating under "interim status" were now subject to a more rigorous permitting timetable and performance standards. Additionally, the amendments significantly increased civil and criminal penalties for non-compliance.

5. Waste Minimization

HSWAs emphasized waste minimization as a national policy goal. Facilities generating hazardous waste were now expected to have formal plans and efforts in place to reduce the volume and toxicity of waste generated. This shifted the focus toward pollution prevention and sustainable materials management rather than solely relying on treatment and disposal.

Implications for National Laboratories

For national laboratories, HSWAs introduced several compliance-critical updates:

- Land disposal of hazardous waste must be preceded by appropriate treatment to meet LDRs.
- Corrective action responsibilities may apply to legacy waste sites or historical contamination, even from discontinued units.
- Generators must implement waste minimization programs as part of overall environmental stewardship.
- Underground tanks and other storage systems must meet modern containment and monitoring standards.

State Authorization and Dual Enforcement

HSWAs reinforced the role of state authorization, allowing states to implement the new provisions if their programs are at least as stringent. However, unlike earlier RCRA provisions, many HSWAs took immediate effect in all states, whether or not the state had been authorized to enforce them—leading to a period of dual enforcement by both EPA and state agencies.

Code of Federal Regulations 40 CFR 260 – 273, 279

Hazardous Waste Regulations under RCRA

The U.S. Environmental Protection Agency (EPA) codified the Resource Conservation and Recovery Act (RCRA) regulations into the Code of Federal Regulations (CFR), Title 40, Parts 260 through 273, with Part 279 added to address used oil management. These sections form the core of the federal hazardous waste regulatory program, providing detailed definitions, requirements, and operational standards to implement the cradle-to-grave management system created by RCRA and expanded by the Hazardous and Solid Waste Amendments (HSWAs) of 1984.

Overview of Parts 260–273 and 279

Part 260 – Hazardous Waste Management System: General - lays the foundation for the RCRA hazardous waste program. It includes:

- Definitions and terminology used throughout the regulations.
- Procedures for submitting petitions to add or remove waste from regulation.
- General requirements applicable to all regulated parties, including recordkeeping and enforcement authority.

Part 261 – Identification and Listing of Hazardous Waste - defines what is considered hazardous waste, a critical step in determining regulatory applicability. It includes:

- Characteristic wastes (ignitability, corrosivity, reactivity, and toxicity).
- Listed wastes from specific sources (F-list), non-specific sources (K-list), and commercial chemical products (P- and U-lists).
- Exclusions for specific materials or recycling activities.

Part 262 – Standards for Generators of Hazardous Waste - outlines the requirements for hazardous waste generators, categorized as:

- Very Small Quantity Generators (VSQGs)
- Small Quantity Generators (SQGs)
- Large Quantity Generators (LQGs)

Key requirements include:

- Waste accumulation time limits and container management.
- Manifesting and recordkeeping.
- Training, emergency preparedness, and biennial reporting for LQGs.

Part 263 – Standards for Transporters of Hazardous Waste - establishes requirements for transporters, including:

- Use of EPA hazardous waste manifests.
- Proper labeling and marking.
- Emergency procedures in the event of a spill.

- Compliance with Department of Transportation (DOT) regulations.

Part 264 – Standards for Owners and Operators of Permitted TSD Facilities - apply to Treatment, Storage, and Disposal (TSD) facilities with RCRA permits. Key topics include:

- Groundwater monitoring.
- Security and inspection requirements.
- Financial assurance for closure and post-closure care.
- Contingency planning and personnel training.

Part 265 – Interim Status Standards for TSD Facilities - sets less stringent standards for TSD facilities operating under "interim status" prior to receiving a full RCRA permit. These facilities must still comply with core health and environmental protections.

Part 266 – Standards for the Management of Specific Wastes & Recyclable Materials - covers special wastes, such as:

- Recycled hazardous waste.
- Spent lead-acid batteries.
- Wastes burned for energy recovery.

Part 267 – Standards for Permitted Hazardous Waste Facilities (Alternative Standards) - provides standards for certain TSD facilities that handle hazardous waste under a standardized permit rather than a full RCRA permit. These standards focus on:

- Container and tank management.
- Inspections and training.
- Preparedness and prevention.

Part 268 – Land Disposal Restrictions (LDRs) - implements the Land Disposal Restrictions (LDR) program established under HSWA. It prohibits the land disposal of hazardous waste unless:

- The waste meets treatment standards, or
- A variance or exemption is granted.
- It includes rules for notification, certification, and recordkeeping related to LDR compliance.

Part 270 – RCRA Permit Requirements - outlines the process for obtaining a RCRA permit, including:

Permit application procedures.

- Public participation requirements.
- Permit modifications, renewals, and revocations.
- A permit under this part is required for facilities that treat, store, or dispose of hazardous waste.

Part 273 – Standards for Universal Waste Management - provides streamlined requirements for managing universal wastes, which include:

- Batteries
- Pesticides
- Mercury-containing equipment
- Lamps (e.g., fluorescent bulbs)

Universal waste rules are designed to promote proper recycling while easing regulatory burdens.

Part 279 – Standards for the Management of Used Oil - establishes management standards for used oil, covering:

- Generators, transporters, and processors/re-refiners.
- Burning of used oil for energy recovery.
- Storage, labeling, and spill response.

Used oil is subject to its own management framework when recycled or burned, rather than disposed as hazardous waste (unless contaminated). (See State Regulatory Drivers below.)

Toxic Substances Control Act (TSCA)

Chemical Management and Reporting Under Federal Law

The Toxic Substances Control Act (TSCA) was enacted by Congress in 1976 to provide the U.S. Environmental Protection Agency (EPA) with comprehensive authority to regulate the production, importation, use, and disposal of industrial chemicals. TSCA was created in response to growing concerns about the widespread use of untested chemicals and their potential impacts on human health and the environment.

TSCA complements other environmental statutes—like RCRA and the Clean Air Act—by specifically addressing the risk management of chemical substances before and after they enter the market, rather than focusing on waste or emissions. It is especially relevant to national laboratories engaged in chemical research, material synthesis, or advanced manufacturing.

TSCA Framework and Purpose

The core purposes of TSCA are to:

- Ensure that chemicals do not pose an unreasonable risk to human health or the environment.
- Require manufacturers and processors to develop and share data on chemical hazards.
- Enable EPA to restrict or ban the manufacture or use of hazardous chemicals.
- Maintain an inventory of chemical substances manufactured or processed in the United States.

TSCA does not inherently classify chemicals as “hazardous” or “non-hazardous,” but instead emphasizes evaluation and control based on risk.

TSCA Reform: The 2016 Lautenberg Amendments

The original TSCA was widely viewed as ineffective in allowing EPA to regulate dangerous chemicals. In 2016, Congress passed the Frank R. Lautenberg Chemical Safety for the 21st Century Act, a major reform that:

- Mandated risk-based chemical evaluations.
- Set firm deadlines for safety reviews.
- Removed barriers to EPA action against high-risk substances.
- Required prioritization of existing chemicals for risk assessment.

This strengthened TSCA’s effectiveness and increased its relevance for chemical users and laboratories.

Key Provisions of TSCA

1. Chemical Inventory and Notification

EPA maintains the **TSCA Inventory**, a comprehensive list of chemical substances that are legally manufactured or processed in the U.S. Laboratories must:

- Ensure that new chemicals are reported to EPA through a Pre-Manufacture Notice (PMN) unless they qualify for an exemption.
- Confirm whether a substance is on the TSCA Inventory before using or importing it in research or production.
- Keep records of chemical identity, volume, and use.

Certain research and development (R&D) chemicals are exempt from full notification, but documentation and labeling are still required.

2. Risk Evaluation and Management

EPA is authorized to identify **high-priority substances** and evaluate their potential risks to health and the environment. If a chemical poses an **unreasonable risk**, EPA may impose:

- Use restrictions
- Exposure limits
- Labeling and recordkeeping requirements
- Full bans or phased-outs

National laboratories may be impacted by these evaluations if they use regulated substances in research or production.

3. Import and Export Regulations

TSCA requires importers and exporters to:

- Certify that imported chemicals comply with TSCA (positive certification), or
- Certify that the chemical is not subject to TSCA (negative certification).
- Notify EPA prior to the export of certain substances regulated under TSCA sections 4, 5, 6, or 7.

This is particularly relevant for international collaborations and procurement of foreign chemicals.

4. Polychlorinated Biphenyls (PCBs)

TSCA specifically prohibits the manufacture, processing, and distribution of PCBs, which are toxic, persistent, and bioaccumulative. Strict handling, disposal, and recordkeeping requirements apply for any facility managing equipment or waste containing PCBs.

5. Recordkeeping and Reporting

Facilities may be subject to reporting under TSCA sections such as:

- **Section 8(a):** Chemical data reporting (CDR) for manufacturing volumes and uses.
- **Section 8(c):** Allegations of significant adverse reactions to health or environment.

- **Section 8(e):** Submission of information on substantial risk.

Laboratories conducting R&D may have limited exemptions but must maintain proper documentation and chemical tracking.

Hazardous Materials Transportation Act (HMTA)

Safe Transportation of Hazardous Materials

The Hazardous Materials Transportation Act (HMTA) was enacted in 1975 to provide the U.S. Department of Transportation (DOT) with the authority to regulate the safe transport of hazardous materials in commerce. The law was passed in response to several serious transportation-related accidents involving hazardous substances and aims to minimize the risks to public safety, property, and the environment.

HMTA applies broadly to any individual or organization that offers, accepts, transports, or handles hazardous materials during transportation, including many activities carried out by national laboratories. The act is implemented and enforced through the Hazardous Materials Regulations (HMR), codified in 49 CFR Parts 100–185.

Purpose and Scope of HMTA

The primary goals of the HMTA are to:

- Protect people and the environment from risks associated with transporting hazardous materials.
- Establish a uniform national regulatory framework.
- Ensure communication of hazards through labeling, placarding, and shipping documentation.
- Support effective emergency response during transportation incidents.

The law applies to all modes of transportation—highway, rail, air, and water—and governs both domestic and international shipments originating in the United States.

Key Provisions of HMTA and the HMR

1. Classification and Packaging

Before a hazardous material can be offered for transport, it must be properly classified according to DOT hazard classes (e.g., flammable liquids, corrosives, toxic substances, radioactive materials). Laboratories must ensure that:

- Waste and samples are accurately identified and assigned to the correct hazard class and UN/NA number.
- Materials are packaged in approved containers that meet performance standards for integrity and compatibility.
- Overpacks and combination packaging meet all required specifications.

2. Labeling, Marking, and Placarding

Proper hazard communication is essential under HMTA. This includes:

- Labels on packages to indicate primary and secondary hazards.

- Markings such as the proper shipping name, UN number, and orientation arrows.
- Placards on transport vehicles when required, based on the type and quantity of material.
- These visual cues help handlers and emergency responders quickly identify hazards during shipping and in the event of an incident.

3. Shipping Papers and Documentation

All hazardous material shipments must be accompanied by shipping papers (e.g., a hazardous waste manifest for RCRA waste) that include:

- Proper shipping name
- UN/NA number
- Hazard class
- Packing group
- Emergency contact information

Manifests and bills of lading must be kept on file in accordance with both DOT and EPA regulations.

4. Training Requirements

Personnel involved in hazardous materials transportation must receive DOT-mandated training initially and every three years thereafter. Required training includes:

- General awareness/familiarization
- Function-specific training
- Safety training (including emergency response)
- Security awareness

National laboratory staff who classify, package, label, or ship hazardous materials—such as laboratory waste coordinators or shipping technicians—must be trained and certified.

5. Security Plans

Certain hazardous materials, including toxic gases and radioactive substances, may trigger requirements for a transportation security plan under 49 CFR §172.800. These plans must address:

- Personnel security
- Unauthorized access prevention
- En route security

This is particularly important for laboratories shipping research-related hazardous materials or mixed radioactive/hazardous waste.

6. Enforcement and Penalties

HMTA grants DOT authority to inspect shipments, facilities, and records to ensure compliance. Violations can result in:

- Civil penalties (often thousands of dollars per day per violation)
- Criminal penalties for willful non-compliance
- Detention or recall of non-compliant shipments

Maintaining compliance reduces legal risk and ensures safe operations across research and support activities.

DOE Orders

Radioactive Waste Management at Department of Energy Facilities

LANL is operated by TRIAD for the National Nuclear Security Administration (NNSA) of DOE. The TRIAD/DOE contract identifies the DOE orders that LANL must follow, including compliance with applicable federal and state laws, regulations, and standards; and radioactive waste management requirements (DOE Order 435.1).

DOE Order 435.1, titled Radioactive Waste Management, was originally issued in 1999 by the U.S. Department of Energy (DOE) to establish comprehensive requirements for managing radioactive waste generated at DOE sites. The order was developed to ensure that DOE activities involving radioactive waste are conducted in a manner that is protective of workers, the public, and the environment.

Change 2, the most recent administrative revision (approved August 2022), updates references and aligns the order with current DOE directives and regulatory expectations, without altering its substantive requirements.

This Order is particularly significant for national laboratories that conduct nuclear research, produce radioactive materials, or manage legacy radioactive waste.

Purpose and Scope

DOE O 435.1 establishes the framework for managing DOE-owned or generated radioactive waste, including:

- High-Level Waste (HLW)
- Transuranic Waste (TRU)
- Low-Level Waste (LLW)
- Waste Incidental to Reprocessing (WIR)

The order applies to all DOE elements and contractors involved in activities that generate, treat, store, or dispose of radioactive waste.

Core Components of the Order

The Order is supported by a Manual (DOE M 435.1-1) and a Guide (DOE G 435.1-1), which provide detailed implementing instructions and best practices.

1. Waste Management Hierarchy

The Order prioritizes:

- Waste avoidance and minimization
- Treatment to reduce volume or hazard
- Safe storage, transportation, and disposal

This approach supports DOE's commitment to environmental protection and long-term stewardship.

2. Radioactive Waste Characterization and Classification

Each type of radioactive waste must be:

- Properly characterized for radionuclide content, physical form, chemical constituents, and potential hazards.
- Classified according to waste type (LLW, TRU, HLW, or WIR), which determines applicable handling, treatment, and disposal requirements.

This classification aligns with DOE missions and federal regulatory frameworks, including 10 CFR Part 61 for LLW and DOE-specific criteria for WIR and TRU waste.

3. Low-Level Waste Management

DOE sites managing LLW must:

- Comply with DOE-specific performance objectives, modeled after NRC requirements but tailored to DOE missions.
- Conduct Performance Assessments (PAs) and Composite Analyses (CAs) to evaluate long-term environmental impacts.
- Implement Waste Acceptance Criteria (WAC) at disposal facilities to ensure safe and compliant disposal.

These assessments support disposal facility design and operational decisions.

4. Transuranic Waste (TRU)

TRU waste, generally characterized by alpha-emitting isotopes with half-lives greater than 20 years and concentrations >100 nCi/g, must:

- Be managed in accordance with DOE and EPA requirements.
- Meet the Waste Isolation Pilot Plant (WIPP) WAC if destined for disposal there.
- Be tracked and documented through rigorous quality assurance programs.

5. High-Level Waste (HLW) and Waste Incidental to Reprocessing (WIR)

DOE Order 435.1 outlines a **risk-informed approach** to classifying and managing HLW and WIR. For WIR, waste must meet specific criteria:

- Removal of radio nuclides to the extent technically and economically practical.
- Waste must not require permanent isolation in a deep geologic repository.
- Must meet performance objectives comparable to LLW.

WIR determinations follow DOE-approved processes and must be thoroughly documented and subject to review.

6. Waste Generator Responsibilities

Generators of radioactive waste at DOE facilities, including national labs, must:

- Characterize and document waste accurately.
- Comply with site-specific WAC and transportation requirements.
- Maintain records to support lifecycle waste tracking.
- Integrate ALARA (As Low As Reasonably Achievable) principles into all waste-related activities.

7. Program Oversight and Quality Assurance

The Order requires DOE sites to implement:

- Formal Radioactive Waste Management Programs approved by DOE Field Elements.
- Independent assessments to evaluate compliance and performance.
- Corrective actions where deficiencies are identified.

Documentation and traceability are emphasized throughout the waste lifecycle.

State Regulatory Drivers:

New Mexico Hazardous Waste Act (NMHWA)

State-Level Oversight of Hazardous Waste Management

The New Mexico Hazardous Waste Act (NMHWA) was enacted by the New Mexico Legislature in 1978, shortly after the federal Resource Conservation and Recovery Act (RCRA) was passed in 1976. The NMHWA establishes the legal framework for hazardous waste management within the state of New Mexico, providing the New Mexico Environment Department (NMED) with authority to implement and enforce hazardous waste regulations consistent with, and in some cases more stringent than, federal standards.

This Act is particularly important for national laboratories and other federal facilities operating within New Mexico, such as Los Alamos National Laboratory and Sandia National Laboratories, as it defines state-level requirements for permitting, compliance, enforcement, and environmental protection.

The New Mexico Hazardous Waste Act (NMHWA) adopts RCRA regulations or imposes stricter regulations that address the management of hazardous and mixed wastes, including wastes generated at LANL.

Purpose and Scope

The purpose of the NMHWA is to:

- Ensure hazardous waste is managed in a manner protective of human health and the environment.
- Provide a state-level permitting and enforcement program.
- Allow the state to receive authorization from the U.S. Environmental Protection Agency (EPA) to operate the RCRA program within New Mexico.
- Promote the reduction, treatment, and proper disposal of hazardous waste generated, stored, transported, and disposed of in New Mexico.

State Authorization under RCRA

New Mexico has received final authorization from EPA under RCRA to administer its own hazardous waste program. This means that the NMHWA and associated regulations (20.4.1 NMAC) are the primary authority for hazardous waste management in the state, in place of direct federal oversight, except where EPA retains certain responsibilities (e.g., for mixed radioactive/hazardous waste or tribal lands).

However, New Mexico's program must remain at least as stringent as the federal RCRA program, and it often includes additional requirements for documentation, corrective action, and permitting.

Key Provisions of the NMHWA

1. Permitting and Regulation of Facilities

Under the NMHWA, any facility that treats, stores, or disposes of hazardous waste must obtain a state-issued permit through the Hazardous Waste Bureau (HWB) of the NMED. This includes:

- Detailed facility design and operational plans.
- Closure and post-closure care plans.
- Financial assurance for long-term waste management.
- Waste analysis, contingency planning, and emergency response requirements.

Federal facilities like national laboratories are subject to these state permitting requirements, in coordination with applicable federal orders and guidance.

2. Corrective Action Requirements

The NMHWA grants the NMED the authority to require corrective action at facilities where hazardous waste or hazardous constituents have been released into the environment. This includes:

- Remediation of soil and groundwater contamination.
- Ongoing monitoring and reporting.
- Public participation in cleanup decisions.

Corrective action is often required as a condition of facility operating permits or through formal enforcement agreements.

3. Compliance Monitoring and Enforcement

The NMED has the power to:

- Conduct inspections and audits.
- Issue notices of violation, compliance orders, and administrative penalties.
- Refer cases for civil or criminal enforcement.

Violations of the NMHWA can result in significant penalties, including fines and, in some cases, legal action against individuals responsible for violations.

4. State-Specific Requirements

New Mexico may impose requirements beyond federal RCRA standards, including:

- Additional reporting and recordkeeping.
- More detailed waste analysis and characterization.
- Enhanced public notice and comment procedures for permit modifications and cleanup actions.

It is the responsibility of facility operators, including laboratory staff, to be familiar with both federal and state-specific hazardous waste regulations.

New Mexico Administrative Code (NMAC), Title 20, Ch. 4.1

Hazardous waste management requirements are specified in New Mexico regulations (*Title 20 of the New Mexico Administrative Code, Chapter 4.1*), which incorporate federal regulations in *Title 40 of the Code of Federal Regulations, Parts 260-273 & 279*. Together, these regulations specify detailed requirements for hazardous waste generation, identification, characterization, short-term accumulation and longer-term storage, treatment, disposal, and recordkeeping.

Internal Regulatory Documents:

LANL Policy and Procedures

The policy page on LANL Inside has all of the policy documents as well as functional series documents that provide necessary additional information. (See the LANL Policy page for the most current versions of these documents.)

P409, Rev. 9, *LANL Waste Management*

2.3 Scope *"This document provides the requirements necessary for responsible waste management at LANL to include planning, generation, determination and characterization, packaging, accumulation and storage, transportation, treatment, and disposal."*

**The content from this Appendix F was generated with the help of AI.*

Appendix

G

Appendix G - References and Links

References and Links

Federal Regulatory Documents: Federal regulations are provided for information only, as they may include elements that are not incorporated into New Mexico regulations applicable to LANL.

RCRA - Summary of the Resource Conservation and Recovery Act
https://www.epa.gov/laws-regulations/summary-resource-conservation-and-recovery-act
Hazardous and Solid Waste Amendments Act (HSWA)
https://www.govinfo.gov/content/pkg/STATUTE-98/pdf/STATUTE-98-Pg3221.pdf
https://www.epa.gov/rcra/history-resource-conservation-and-recovery-act-rcra
Toxic Substances Control Act (TSCA)
Summary of the Toxic Substances Control Act
https://www.epa.gov/laws-regulations/summary-toxic-substances-control-act
Hazardous Materials Transportation Act (HTMA)
https://archive.epa.gov/emergencies/content/lawsregs/web/html/hmtaover.html
DOT regulations (49 CFR 171–178)
https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-C/part-171
DOE O 435.1 Chg. 2 (Admin Chg.), Radioactive Waste Management
https://www.directives.doe.gov/directives-documents/400-series/0435.1-BOrder-chg2-AdminChg
LANL Hazardous Waste Facility Permit
https://int.lanl.gov/environment/waste/permit-tracking.shtml
https://int.lanl.gov/environment/waste/_assets/docs/Full-Permit---January-2024-reducedsize.pdf
Triad/DOE Contract
https://int.lanl.gov/org/ddops/oma/prime-contract-management/prime-contract/index.shtml
NMAC, Hazardous Waste Management
http://164.64.110.239/nmac/parts/title20/20.004.0001.htm
Code of Federal Regulations
40 CFR 260, Hazardous Waste Management System: General
40 CFR 261, Identification and Listing of Hazardous Waste
40 CFR 262, Standards Applicable to Generators of Hazardous Waste
40 CFR 268 Land Disposal Restrictions, Subpart A, General
40 CFR 273, Standards for Universal Waste Management
40 CFR 279, Subpart C, Standards for Used Oil Generators

LANL Policy and Procedures
P409, *LANL Waste Management*
FSD-P409-0100, *Waste Planning*
FSD-P409-0300, *Waste Characterization and Compatibility*
FSD-P409-0400, *Waste Determination and Categorization*
FSD-P409-0600, *Waste Accumulation and Storage*
TP-P409-0700, *On-Site Waste Management Field Tasks*
AP-P409-1000, *Facility Operating Record Requirements for Waste Documentation*
IG-P409-0229, *Empty Containers*
EPC-WMP-WCATS-GUIDE-002, *Waste Compliance and Tracking System (WCATS) User Guide**
EPC-ES-GUIDE-016, *Pollution Prevention is Source Reduction**
LANL Hazardous Waste Contingency Plan Quick Reference Guide, January 2024

* Requires access to EDRMS. See EPC Environmental Management System (EMS) Plans & Procedures page for guidance.