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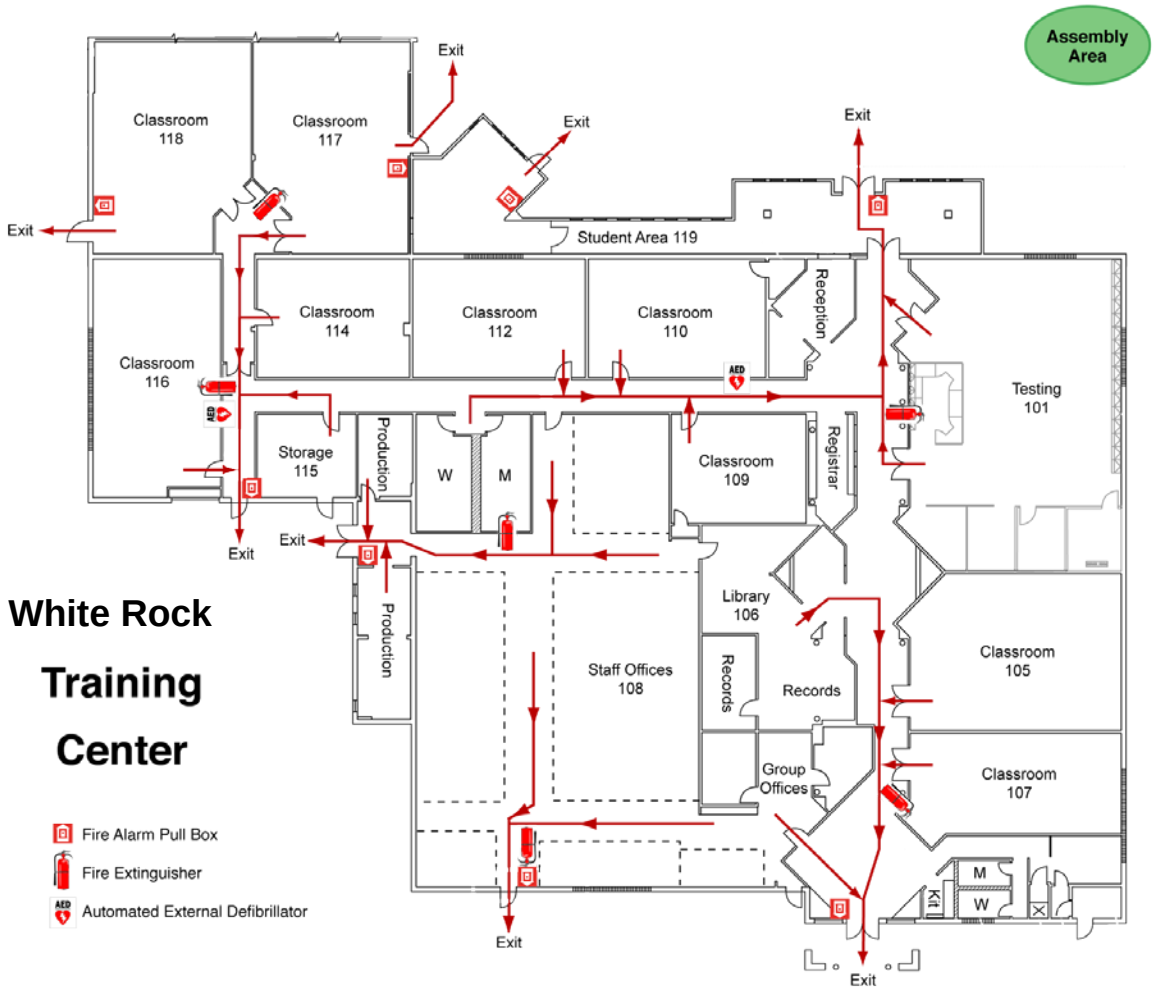
Waste Generation Overview

COURSE 23263

January 2017



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Introduction

Course Overview

This course, *Waste Generation Overview Live* (COURSE 23263), provides an overview of federal and state waste management regulations, as well as Los Alamos National Laboratory (LANL) policies and procedures for waste management operations. The course covers the activities involved in the cradle-to-grave waste management process and focuses on waste characterization, waste compatibility determinations and classification, and the storage requirements for temporary waste accumulation areas at LANL.

Course Objectives

When you have completed this course, you will be able to

- recognize federal, state, and LANL environmental requirements and their impact on waste operations;
- recognize the importance of the cradle-to-grave waste management process;
- identify the roles and responsibilities of key LANL waste management personnel (e.g., Waste Generator, Waste Management Coordinator, Waste Stream Profile approver, and Waste Certification Official);
- characterize a waste stream to determine whether it meets the definition of a hazardous waste, as well as characterize the use and minimum requirements for use of acceptable knowledge (AK) for waste characterization and waste compatibility documentation requirements; and
- identify the requirements for setting up and managing temporary waste accumulation areas.

Target Audience

The training courses listed in this section are required for all workers who generate waste (except office trash). Workers must notify their managers of expired training. There is no grace period for the following training requirements; this training must be completed and current.

Audience	Course Name and COURSE	Frequency
Generators and waste management coordinators (WMCs)	**Waste Generation Overview Live,* COURSE 23263 *Waste Generation Overview Refresher,* COURSE 21464	Once Every 36 months
Persons who work in or who are owners of less-than-90-day waste accumulation areas	†*RCRA Personnel Training,* COURSE 7488 †*RCRA Refresher (Self-Study),* COURSE 28582	Once Every 12 months
Persons who work in treatment storage facilities (TSFs)	**Waste Generation Overview Live,* COURSE 23263 †*RCRA Personnel Training,* COURSE 7488 †*RCRA Refresher (Self-Study),* COURSE 28582	Once Once Every 12 months
Remediation workers	**Waste Generation Overview Live,* COURSE 23263 †*HAZWOPER: General Site Worker,* COURSE 4464 or †*HAZWOPER: Limited Site Worker* COURSE 4465 †*RCRA Personnel Training* COURSE 7488 †*HAZWOPER: Refresher* COURSE 28652 †*RCRA Refresher (Self-Study)* COURSE 28582 Courses to be selected by management	Once Once Every 12 months Every 12 months As necessary for job duties

* *If preferred, a worker may take a live course instead of the equivalent online refresher; however, refresher courses MAY NOT be substituted for live courses.*

† *This RCRA-related training must be completed within 6 months of employment; during this period, workers must work under the supervision of a trained worker.*

Course Limitations

This course presents basic roles and responsibilities for hazardous waste generators and also identifies the regulations, policies, and requirements that define waste handling at LANL. It does not detail facility- and job-specific training that may be required by facilities that handle waste at LANL.

About This Course

This course consists of an introduction, four training modules, and an answer key that contains answers to the activities found throughout the manual. Your classroom instruction will include a slide presentation.

Acronyms

ADESH	Environment, Safety & Health Directorate
AHA	activity hazard analysis
AK	acceptable knowledge
C-IIAC	Inorganic, Isotope, and Actinide Chemistry group
CFR	Code of Federal Regulations
CSA	container storage area
CWA	Clean Water Act
CWDR	chemical waste disposal request
DAF	dissolved air flotation
DOE	Department of Energy
DOP	detailed operating procedure
DOT	Department of Transportation
EPC-CP	Environmental Compliance Programs
EPA	Environmental Protection Agency
ER	environmental restoration
FFCA	Federal Facilities Compliance Act
FFCO	Federal Facility Compliance Order
FMU	Facility Management Unit
GIC	Green Is Clean
HCP	hazard control plan
HMTA	Hazardous Materials Transportation Act
HSWA	Hazardous and Solid Waste Amendments
HWFP	hazardous waste facility permit
IAF	induced air flotation
ID	identification
IRF	inspection record form
IWD	integrated work document
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LDR	land disposal restriction
LLW	low-level (radioactive) waste
MLLW	mixed LLW
MTRU	mixed TRU
MTSCA	mixed TSCA
NMED	New Mexico Environment Department
NMHWA	New Mexico Hazardous Waste Act
NNSA	National Nuclear Security Administration
NOV	notice of violation
OS-PT	Operations Support—Packaging & Transport
OSHA	Occupational Safety and Health Administration
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
SAR	safety analysis report
SARA	Superfund Amendments and Reauthorization Act
SDS	safety data sheet
SME	subject matter expert
SOP	standard operating procedure
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
TSF	treatment and storage facility
TSR	technical safety requirement
UHC	underlying hazardous constituent
UHWM	uniform hazardous waste manifest
UPS	uninterrupted power supply
US	United States
USEPA	United States Environmental Protection Agency
USQD	unreviewed safety questionnaire determination
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

Definitions

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, supplemental waste analysis data, and/or facility records of analysis. Minimum acceptable documentation is defined in Environment, Safety & Health Directorate (ADESH)-AP-TOOL-111, "Waste Characterization."
accumulation start date	The date on which each period of accumulation of waste in a container or tank begins. The following need an accumulation start date: NM special waste, universal waste, <90-day area, and TSF containers. The following do not: SAA, used oil, and nonhazardous wastes.
acutely hazardous waste	Discarded commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, or technical grades of the chemical that are identified in 40 CFR 261.33 (e) as acute hazardous waste or hazardous wastes with a hazard code of "P."
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, certain New Mexico special wastes, and empty containers greater than 30 gallons.
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.
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 may include, but is not limited to, 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 nonmanufacturing 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, but not limited to, steel, 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.
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.
disposal	The discharge, deposit, injection, dumping, spilling, leaking, or placing of any waste into or on any land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.
environmental restoration	A term used by the DOE to describe cleanup of DOE facilities and lands.
general storage area	A PCB storage area that meets specific record-keeping and construction requirements, including secondary containment, for up to 90-day, onsite storage of PCB waste.
hazardous waste	A solid waste that is not excluded from regulation as a hazardous waste and is a listed hazardous waste or exhibits any of the hazardous characteristics: ignitibility, corrosivity, reactivity, or toxicity.
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.
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	Includes radioactive waste, chemical waste, high-explosives waste, and other industrial waste that is not acceptable for discharge into the Sanitary Wastewater Systems Plant.

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.
less-than-90-day (<90-day) 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.
liquid waste	A waste material that is determined to contain free liquids.
low-level waste	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 containing hazardous waste and source, special nuclear, or byproduct. The use of the generic term “mixed waste” shall refer to both mixed LLW waste and mixed TRU 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.
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.
orphan waste	See “no-known-owner waste.”
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.
profile	The Waste Compliance and Tracking System (WCATS) record associated with a task, container, waste stream, etc.
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 either 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. No waste generated at LANL is "municipal solid waste"; items normally classified as sanitary waste at home are commercial solid waste (see definition) if generated at LANL.
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. 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.
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).
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	Garbage, refuse, sludge (as defined above), and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and/or agricultural operations and from community activities.
staging area (radioactive waste)	A registered area designated for the routine staging of radioactive waste before it is transported to a storage area or TSF.
storage area (radioactive waste)	The temporary holding of radioactive waste for transfer to treatment, storage, or disposal elsewhere. Waste must be packaged for shipment in accordance with LANL waste acceptance criteria (WAC). Storage must not exceed 1 year, except for wastes with no disposal path.
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 Secretary of Energy has determined, with the concurrence of the Administrator of the EPA, 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	When applied to hazardous or hazardous components of mixed waste, any method, technique, or process (including neutralization) designed to change the physical, chemical, or biological character or composition of any waste so as to neutralize such waste or so as to recover energy or material resources from the waste or so as to render such waste nonhazardous or less hazardous and safe to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.
treatment and storage facility (TSF)	A permitted or interim status hazardous waste management unit, where hazardous or mixed waste may be stored up to 1 year or treated before disposal. No active RCRA hazardous or mixed waste disposal units exist at LANL.

universal waste	The following types of hazardous waste are subject to the universal waste requirements of 40 CFR §273; 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.
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 generator	Individuals and their line management who have direct responsibility for operations that generate waste. A waste generator may be a member of the organization responsible for the facility or site where the waste was generated. Waste generators are responsible for waste minimization, characterization, storage, and disposal of the waste they generate.
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	A waste or group of wastes from one or more processes or facilities with similar physical, chemical, and/or radiological characteristics.

Notes. . . .

Module 1: Framework for Compliance

Module Objectives

When you have completed this module, you will be able to identify

- federal, state, and internal environmental regulatory requirements that guide LANL waste management practices and procedures; and
- the consequences of noncompliance with environmental laws and regulations.

Background

In the early 1970s, the pesticide known as *kepone* contaminated the waters of the James River in Virginia, as well as the land and air, endangering—and in some cases damaging—the health of the employees at the facility that manufactured the product (see “The Kepone Disaster” on the next page). In response to this situation, the federal government passed the Toxic Substances Control Act (TSCA) and in 1976, the Resource Conservation and Recovery Act (RCRA).

In the years following this legislation, facilities owned by the Department of Energy (DOE) were directed by the DOE to comply with the administrative and technical requirements of hazardous and mixed waste regulations but were excluded from enforcement actions for noncompliance. However, in 1992 the federal government passed the Federal Facilities Compliance Act (FFCA). Under the FFCA, all federal facilities could be fined and penalized for noncompliance with hazardous and mixed waste regulations, particularly the regulations implementing RCRA.

The Kepone Disaster

In 1973, in Hopewell, Virginia, Life Science Products began producing the pesticide *kepone*. Shortly thereafter, reports of health problems among the employees of Life Science Products led to investigations by the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), and the State of Virginia. These investigations revealed that Life Science Products had violated numerous environmental, safety, and health regulations. Life Science Products and Allied, the company that awarded the contract to Life Science Products, had illegally discharged kepone and other chemicals into the James River, which empties into the Chesapeake Bay.

The James River

After kepone production began, several workers at Life Science Products reported health-related problems, such as tremors, skin changes, blurred vision, and loss of memory; 76 workers were diagnosed with kepone poisoning, 31 of whom had to be hospitalized immediately. Periodic surges of white, foamy, pungent wastewater came into the local sewage treatment plant 2 weeks after the pesticide began being produced. Within 2 months, the contaminated wastewater had killed the bacteria in the digester system at the plant. Despite this, the public works department illegally landfilled the undigested sewage materials.

Federal and state investigations concluded that the landfilled sludge—as well as fish and shellfish in the nearby James River—was contaminated and that the air was contaminated with fine particulates of kepone dust.

In July 1975, the health department closed the facility. The grand jury brought criminal charges and monetary fines against the owners of Life Science Products, the owners of Allied, four supervisory employees at the Allied facility in Hopewell, and the City of Hopewell itself.

-Chemical Engineering Series: Hazardous Waste Management, by Charles A. Wentz, McGraw-Hill, Inc.

Activity 1: Test Your Knowledge of LANL Waste Requirements

Instructions

The following questions will be discussed in class. The answers to these and other questions will emerge as we complete this course.

1. What kinds of items are recycled at LANL? Are recycled items subject to hazardous waste regulations?

2. You are a chemist at LANL who regularly works with acid solutions. Are you allowed to neutralize these solutions, or must they be managed as hazardous waste?

3. You have leftover paint from a project in your work area. Are you allowed to throw the half-empty paint can into a LANL dumpster, or must you manage the paint as a hazardous waste?

4. How can “green purchasing” reduce the amount of waste generated at LANL?

Drivers for Environmental Protection

The drivers that affect waste management practices at LANL include the following:

- federal drivers:
  - RCRA,
  - Hazardous and Solid Waste Amendments (HSWAs),
  - TSCA,
  - Hazardous Materials Transportation Act (HMTA), and
  - DOE Orders;

- state drivers:
  - New Mexico Hazardous Waste Act (NMHWA),
  - LANL Hazardous Waste Facility Permit,
  - Administrative Compliance Order HWB-14-20, and
  - Settlement Agreement and Stipulated Final Order HWB-14-20 (CO);
- internal drivers:
  - Los Alamos National Security, LLC (LANS)/DOE Contract and
  - LANL Policy and Procedures.

Federal Drivers for Environmental Protection

Resource Conservation and Recovery Act

RCRA provides a regulatory framework for managing solid and hazardous waste. The objectives of this legislation include

- protecting human health and the environment from potential waste disposal hazards,
- conserving energy and natural resources,
- reducing the amount of waste generated,
- ensuring that waste is managed in an environmentally sound manner, and
- cleaning up contaminated sites created from past practices by implementing a corrective action program.

RCRA establishes directives and guidelines for the Environmental Protection Agency (EPA) to regulate solid and hazardous waste management and disposal. RCRA legislation has 10 subtitles, 4 of which are regulated.

The following table lists the subtitles that provide a programmatic framework for the regulated community to follow.

Standards for . . .	are provided in . . .
hazardous waste management	Subtitle C
solid waste management	Subtitle D

Hazardous Waste Regulations

Hazardous waste regulations were developed by the EPA in an effort to meet the intent of RCRA. The regulations provide an enforcement mechanism for state and federal regulatory agencies and require the implementation of measures that ensure proper waste management, from the point of generation to ultimate disposal.

RCRA hazardous and solid waste regulations are applicable to generators, transporters, and owners or operators of facilities that treat, store, or dispose of wastes. Major elements of the hazardous waste regulations [Title 40 of the Code of Federal Regulations (CFR) Parts 260–282] include

- characterization and classification of hazardous waste;
- generator, transporter, and treatment and storage facility (TSF) standards;
- recycling standards;
- controls on land disposal;
- permitting requirements;
- state program requirements;
- used oil management standards; and
- underground storage tank requirements.

Hazardous and Solid Waste Amendments

The HSWA of 1984 significantly expanded the regulatory scope of RCRA and introduced requirements to ensure that groundwater is protected from chemical contamination. Requirements under the HSWA that are most applicable to LANL operations include environmental cleanup of contaminated sites and restrictions on future land disposal of many untreated hazardous wastes.

Environmental Cleanup

Environmental cleanup and corrective actions associated with releases of hazardous waste or constituents are required by federal and state regulatory agencies for facilities that treat, store, or dispose of hazardous waste. Environmental cleanup and corrective actions are necessary to protect human health and the environment.

Land Disposal Restrictions

Because of concerns that hazardous chemicals leaching from waste at land disposal sites could migrate through the soil and ultimately contaminate the groundwater, the EPA imposed stringent controls on the land disposal of hazardous wastes. Land disposal restrictions (LDRs) were introduced to ensure that waste is treated to immobilize or destroy harmful chemical components before being the waste is eliminated by land disposal. The LDRs specify concentration-based treatment standards and technology-based treatment standards.

The EPA has developed treatment standards for hazardous wastes. The objective of a treatment standard is to develop concentration levels (based on the best-demonstrated available technology for treated wastes) below which they may be safely land disposed.

Note: *Occasionally the EPA establishes a technology-based treatment standard that requires the use of a specific technology on a particular waste stream before it is eliminated by land disposal.*

Toxic Substances Control Act

The TSCA was decreed by Congress in response to public concerns over growing evidence of the toxicological effects of chemicals introduced into the market. The primary purpose of the TSCA is to characterize and understand the risks that a chemical poses before the chemical is introduced for public use.

The TSCA is intended to provide protection from toxic substances manufactured, processed, distributed, or used in the United States (US). 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, and
- hazardous substances must be controlled for public protection.

Note: *Polychlorinated biphenyl (PCB) compounds and asbestos are the primary TSCA-regulated substances found at LANL. For more information on the management of PCBs, consult P409, Waste Management.*

Waste asbestos must be properly bagged, labeled, and disposed of.

PCB-containing items.

Hazardous Material Transportation Act

The Department of Transportation (DOT) issues regulations (through the HMTA) that govern the transportation of hazardous and mixed waste in transit or in storage for transit.

RCRA regulations governing waste transportation refer to and coordinate with DOT regulations. In addition to DOT-required documentation, RCRA requires the completion of an additional document for waste-tracking purposes—the uniform hazardous waste manifest (UHWM). As agreed by DOT and the EPA, the UHWM is the shipping paper for the transport of RCRA-regulated wastes.

DOT regulations (49 CFR 171–178) for transporting hazardous or mixed waste include requirements for

- DOT shipping information,
- packaging,
- marking,
- labeling, and
- placarding.

Note: *Hazardous waste transportation over public roads within Los Alamos County must comply with DOT requirements.*

Mistaken Identity of Drum Results in Shipping Error

On March 21, 2003, at Technical Area (TA) 15, Building 312, KSL (a previous support service subcontractor consisting of KBR, Shaw, and LATA) personnel inadvertently removed a 55-gal. drum of hazardous waste from a satellite accumulation area (SAA) and transported it to TA-54. They had intended to remove a 30-gal. drum of nonhazardous waste containing oil-soaked rags and related material. On March 5, 2003, before the incident, KSL workers had cleaned up a hydraulic oil spill at TA-15 and deposited rags and other material in a 30-gal. drum. The container remained at TA-15 for 2 weeks. When KSL workers arrived at TA-15 to remove the drum, numerous parked vehicles blocked the view of the 30-gal. container. The workers instead spotted a 55-gal. drum containing paint and paint coatings and loaded the drum into their vehicle. The hazardous waste was transported without the proper documentation, including a waste profile form, a chemical waste disposal request (CWDR) form, and a shipping manifest.

- *HALO-LA-LANL-FIRNGHELAB-2003-2006*

Department of Energy Orders

LANL is operated by LANS for the National Nuclear Security Administration (NNSA) of the DOE. The DOE issues orders that address

- compliance with applicable federal and state laws, regulations, and standards; and
- radioactive waste management requirements (DOE Order 435.1).

The LANS/DOE contract stipulates the DOE orders that LANL must follow. DOE has the authority to perform audits and shut down operations for noncompliance with these orders. For more information on management of radioactive waste, consult P930-2, *Radioactive Waste Certification Program*.

State Drivers for Environmental Protection

New Mexico Hazardous Waste Act

The NMHWA is implemented through the state's hazardous waste regulations found in Title 20 of the New Mexico Administrative Code Part 4.1 (20 NMAC 4.1). The NMHWA adopts regulations set forth under RCRA or imposes more stringent regulations and governs the management of hazardous and mixed wastes, including wastes generated at LANL.

Note: *The New Mexico Environment Department (NMED) is authorized by the EPA to implement and enforce RCRA regulations in the State of New Mexico.*

LANL Hazardous Waste Facility Permit

RCRA and state regulations require that LANL have a permit to operate TSFs. LANL's Hazardous Waste Facility Permit, issued through NMED, identifies standards for facility operation, including administrative standards and technical standards. The first permit, which was issued in November 1989, is renewed every 10 years. LANL's current permit was signed in December 2010. LANL must meet the conditions of the permit or be subject to fines, penalties, and/or notices of violation (NOVs).

Internal Drivers for Waste Management

LANS/DOE Contract

LANS operates LANL for the NNSA under a contract with the DOE. The LANS/DOE contract includes environmental compliance measures pertaining to

- environmental restoration (ER) and waste management;
- environment, safety, and health; and
- waste minimization/pollution prevention.

DOE performs annual evaluations to assess LANL's progress in meeting the performance measures stated in the LANS/DOE contract. Failure to meet these measures could jeopardize contract renewal.

LANL Policy and Procedures

LANL institutional documents are subject to revision, and documents are added and deleted regularly. For the latest LANL policies, click on Performance Tools > Policy Center on the LANL home page.

LANL has written requirements to carry out the federal and state laws that apply to hazardous and mixed wastes. Mandatory requirements, as well as those requirements suggested by DOE, are documented in the LANS/DOE contract. LANL's documentation structure consists of

- the LANS/DOE contract,
- governing policies,
- system descriptions,
- program descriptions,
- procedures,
- requirements,
- notices, and
- other institutional documents.

LANL procedures that impact waste management operations include

Requirement	Title
P409	*LANL Waste Management – and associated P409 Tools*
P101-14	*Chemical Management*
P409-1	*LANL Waste Acceptance Criteria (replaces P930-1)*

Note: *LANL institutional documents are subject to revision, new documents are added, and old documents are deleted regularly. For the latest updates of LANL policies, click on the Top Tools/Policies link on the LANL homepage:*

https://int.lanl.gov/policy/environment.shtml.

The P409 tools may be found at the following link on the LANL homepage:

http://int.lanl.gov/org/padops/adesh/environmental-protection/quality-assurance/p409-tools.shtml.

Consequences of Noncompliance

LANL policy documents require compliance with applicable regulations. Waste generators are liable for noncompliance with environmental regulatory requirements. The following table describes the consequences of noncompliance.

Noncompliance can result in . . .	**which . . .**
disciplinary action	may include • leave without pay, • termination, and/or • written or oral reprimand.
civil violations*	• may result in fines (possibly retroactive) and penalties up to – $27,500/day per violation or – $50,000/day per violation for chronic violations and • can include – loss of permits required to operate or – shutdown of operations.
criminal violations*	are classified based on • intentional violations; • inadequate supervision of employees committing intentional violations; or • intentional failure to perform corrective action for violations, which can result in – fines and penalties up to $50,000/day and/or – 2 years in prison; and can include • loss of permits required to operate or • shutdown of operations.
administrative action	can include • loss of permits required to operate or • shutdown of operations.
***Fines and penalties may be retroactive and are nonallowable costs that must be paid out of the LANS fund for the operation of LANL.*	

Icebreaker Activity

1. The instructor will divide the class into groups.
2. Each group will network among its members. For example, find out
   - how long they've been at LANL,
   - their job responsibilities,
   - the type of waste that is generated from their operations,
   - how their waste is managed, etc.
3. Each group will select a spokesperson to share with the class what was discovered during the activity.

Notes:

Module 2: Waste Characterization

Module Objectives

When you have completed this module, you will be able to

- characterize a waste stream to determine whether it meets the definition of a RCRA hazardous waste,
- recognize regulated RCRA nonhazardous waste streams generated at LANL,
- recognize the mixture and derived-from rules associated with hazardous and nonhazardous waste streams, and
- recognize the requirements associated with managing containers.

Chemical Reaction Causes Waste Collection Bottle to Rupture

On February 2, 2005, at Pacific Northwest National Laboratory, a chemical reaction inside a 4-liter glass waste-collection bottle caused the bottle to rupture. Incompatible chemicals (methanol and nitric acid) mixed and generated gas inside the waste-collection bottle, which was labeled for the collection of acid waste. The rupture also broke an adjacent 4-liter bottle. The contents of both bottles spilled into a secondary container. No one was in the laboratory area when the bottle ruptured.

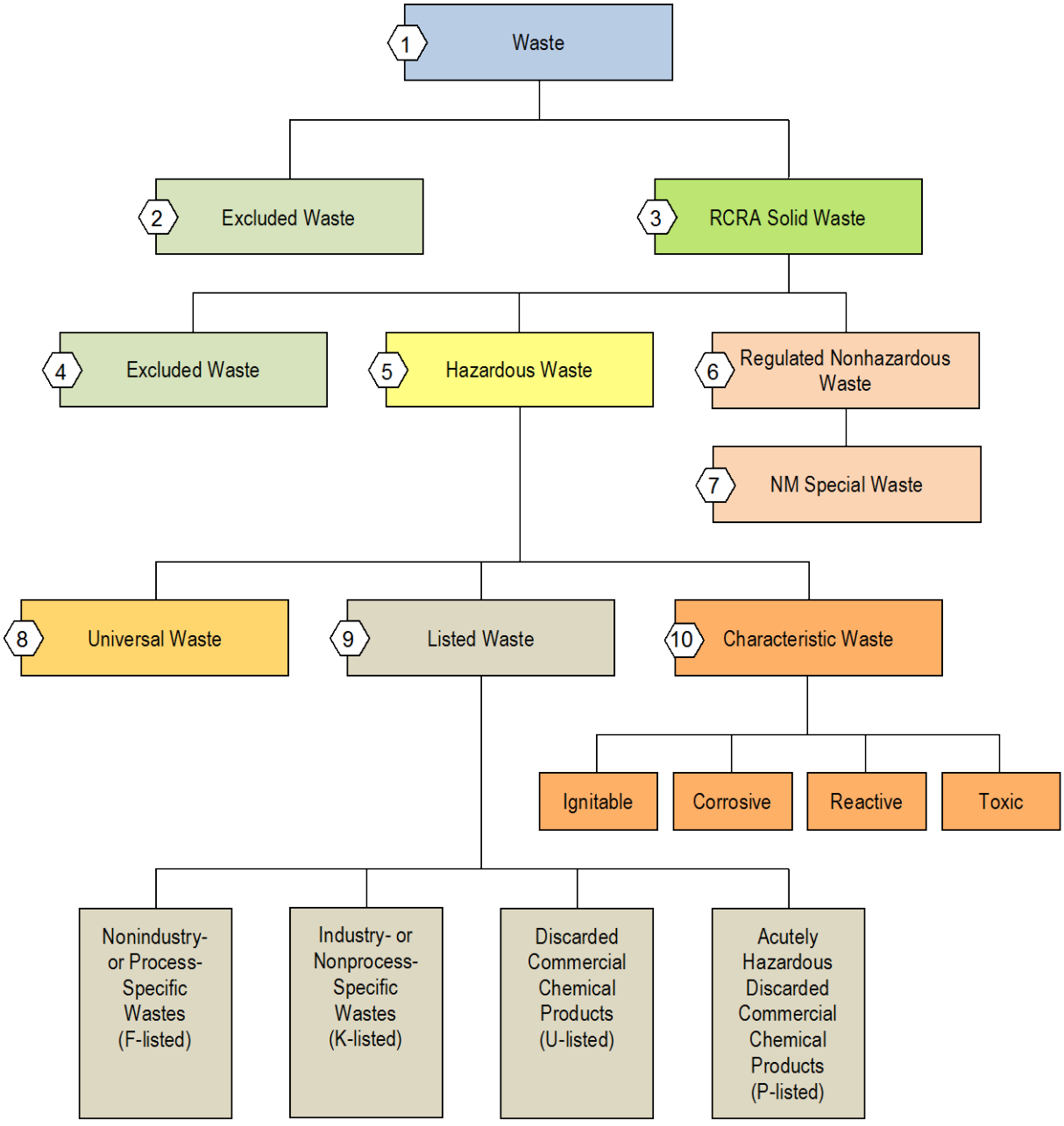
Investigators discovered that in August 2004, a student researcher had mixed the methanol (organic) with hydrochloric acid and ferric chloride (inorganic acids) as part of the workup for an experiment. At the time of disposal, the researcher considered the mixture an “acid waste” and disposed of it in the half-full waste bottle that already contained nitric acid. Methanol is compatible with hydrochloric acid but not nitric acid. The student researcher deviated from the experiment workup procedure, which was designed so that the acid component would be disposed of before performing the methanol wash step. This procedure would have allowed the two process streams to be disposed of separately. However, this step was ignored, and the waste streams were combined.

-RL-PNNLPNNLBOPER-2005-2004

Waste Categories

Generators must accurately characterize waste streams and identify all waste constituents or components. Generators must also identify the process that generated the waste and the physical state of the waste. Proper characterization of a waste stream is a critical step in the waste management process because it helps in determining how to safely handle, transport, treat, store, and/or dispose of the waste, as well as how to minimize costs.

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 determination. A detailed explanation of this process follows.



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

2 **Solid Waste Exclusions**

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 and 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);
- PCB wastes and/or asbestos (TSCA); and
- *in situ* (in-place) mining wastes.

3 **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 wastelike;
- 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.

If your waste does not meet the RCRA definition of solid, hazardous, or regulated nonhazardous, it may be an excluded waste. Descriptions of solid and hazardous waste exclusions follow.

6 ***Regulated Nonhazardous Waste***

Regulated nonhazardous 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.

7 *New Mexico 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;
- packing house and killing plant offal;
- 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; and
- petroleum-contaminated soils.

4 Hazardous Waste Exclusions

Some waste streams that meet the definition of a solid waste are excluded from being considered a RCRA hazardous waste. The following table provides a partial list of solid waste streams that are excluded from being regulated as hazardous waste:

Hazardous waste exclusions include the following:
Samples • in transit to or from analysis • stored in a laboratory before or after analysis • used in treatability studies (A treatability study examines pretreatment requirements, optimal process conditions, efficiency, and whether the waste is amenable to the treatment process.) ***Note:*** *Samples are collected for the sole purpose of testing to determine characteristics or composition of the waste stream.*
Household waste. Wastes generated in a household have a lifetime exemption from RCRA. ***Note:*** *Wastes generated from household commercial chemical products used at LANL that exhibit a RCRA characteristic or contain listed constituents must be managed as hazardous waste. All waste generated at LANL is regulated.*

5 ***RCRA Hazardous Waste***

A RCRA hazardous waste is always a solid waste and may be considered hazardous if it is a **universal** waste, a **listed** waste, or a waste that exhibits a hazardous **characteristic**.

8 ***Universal Waste***

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 (such as nickel-cadmium and lead-acid),
- pesticides,
- mercury-containing equipment,
- discarded lamps that exhibit a hazardous characteristic, and
- aerosol cans (in New Mexico).

9 ***Listed Waste***

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

- the waste exhibits any of the characteristics (ignitable, corrosive, reactive, or toxic) of hazardous waste;
- the waste is fatal to humans in low doses or is capable of causing or significantly contributing to an increase in serious irreversible or incapacitatingly reversible illness;
- the waste contains substances that have been shown in scientific studies 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.

*Teratogenic: of, relating to, or causing malformations of an embryo or fetus.

A solid waste becomes a hazardous waste if the waste stream is classified as

- F-listed,
- K-listed,
- U-listed, or
- P-listed.

10 ***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 incapacitating 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 hazardous waste if it exhibits one of the following characteristics:

- ignitable,
- corrosive,
- reactive, or
- toxic.

Hazardous Waste Types

The following table describes hazardous waste types.

Waste Types	Description	Examples
Listed Waste		
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 can be used only if the compound is the **sole active ingredient**.*		
Characteristic Waste		
ignitable D001	• flashpoint <60°C or 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) • certain metals (e.g., arsenic, barium, lead) • certain pesticides

Mixture Rule		
The mixture of . . .	**with . . .**	**will be classified as hazardous waste . . .**
nonhazardous waste	characteristic waste	if the mixture still exhibits the hazardous characteristic.
	listed waste	always.

Mixture Rule		
The mixture of . . .	**with . . .**	**will be classified as hazardous waste . . .**
nonhazardous waste	characteristic waste	if the mixture still exhibits the hazardous characteristic.
	listed waste	always.

Derived-From Rule	
Residue derived from . . .	**will be classified as hazardous waste . . .**
characteristic waste	if the residue still exhibits the hazardous characteristic.
listed waste	always.

Note: The Hazardous Waste Determination Process is shown in Appendix A.

Waste Characterization

Accurate waste characterization is a RCRA requirement) Waste generators and treatment or storage units must maintain the following documentation on each generated, treated, or stored waste stream:

- hazardous waste determination with identification (ID) for all applicable EPA hazardous waste codes;
- waste characterization to determine if LDRs apply; and
- waste compatibility determination, including evaluation of waste to waste contents, waste to container, and waste to external wastes (e.g., waste containers in storage or transportation).

Sampling and Analysis

- Waste sampling and analysis performed in accordance with
  - LANL Hazardous Waste Facility Permit (HWFP), Section 2.4;
  - US EPA (USEPA) SW-846 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods;* and
  - Attachment C, Tables C-16, C-17 and C-18 (HWFP Waste Analysis Plan).

- Representative samples must “exhibit average properties of the whole” and must be defensible as a representative sample of the waste stream as a whole.

- Older (non-SW-846) analytical method results may be used to supplement other AK documentation.

  Note: Generators at LANL use the same criteria for sampling and analysis as permitted units.

Acceptable Knowledge

To be considered, NMED and the USEPA require that AK be accurate, sufficient, and current. LANL has defined acceptable minimum requirements in the P409 guidance ADESH-AP-TOOL-111, *Waste Characterization*.

AK is a method used by the waste generator to document the characterization of waste in lieu of approved sampling and analysis. AK, at a minimum, must demonstrate and communicate 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. This information may be documented in laboratory notebooks, test plans, facility operating records, and/or hazard or safety analysis plans that list material input/output or process flow diagrams.

Additional information that may be provided as AK includes surrogate material testing results, an estimate of the waste homogeneity, chemical byproducts or material transformations relevant to waste composition, a basis for how the waste constituents and contaminants are identified and bounded (e.g., how are minimum-maximum concentrations determined), and process controls used to ensure that the waste remains within the bounds of the defined waste stream profile.

Secondary (Job Waste) Material

During packaging and repackaging of waste by the generator or processor, the addition of secondary (job waste) material into the final waste container may occur. ADESH-IG-TOOL-101 *Waste Management Glossary* defines secondary material as

> …miscellaneous materials associated with waste processing that are placed into primary or daughter drums during packaging or repackaging. Examples of secondary waste includes 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, rigid liner lids cut into pieces).

It is imperative that waste be segregated to minimize waste compatibility issues. Waste compatibility is defined in ADESH-IG-TOOL-101, *Waste Management Glossary,* and the requirements for evaluating waste compatibility are described below.

Waste Compatibility

ADESH-IG-TOOL-101 *Waste Management Glossary* defines compatibility as

> …hazardous/mixed waste[s that] can be safely mixed with sorbent material and may not result in any of the following potential reactions: heat generation, fire or explosion, gas and [/or] flammable gas generation, fume or flammable fume generation, toxic dusts or mists, or corrosion or decay of the container, including the inner liner.

The requirements for documenting a waste compatibility evaluation are provided in ADESH-AP-TOOL-115, *Waste Compatibility Determinations*.

Waste generators and TSFs must document and provide, upon request, documentation used in making waste compatibility determinations. The compatibility determination 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.

Three types of waste compatibility are of concern and the focus of TOOL-115:

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

The evaluations are required before waste is generated (part of waste characterization) and at waste repackaging or processing. Some of the data used in the evaluations may come from basic chemical information sources [safety data sheets (SDSs), online databases (e.g., CAMEO or WISER – see TOOL-115 for e-links)] or direct waste analysis. Chemical compatibility testing may include determining waste reactivity, measuring oxidation-reduction potential, testing for cyanides and sulfides, and measuring pH.

The evaluations must consider compatibility of the waste stream and other materials mixed or placed within the container. Such materials could include neutralizers or absorbents used by the generator at the time the waste was generated or any secondary material or secondary job waste added during later treatment or processing.

Evaluation of compatibility within a container must meet LANL permit requirements (Section 2.8.2) and EPA regulations (40 CFR 264.177) adopted by NMED. Recommended methods are described in TOOL-115 and summarized below:

- 40 CFR 264, Appendix V, or 40 CFR 265, Appendix V, provides a method of classifying waste materials into chemical groups, then comparing the groups for adverse reaction potential. The required records generated include a listing of the chemical groups identified in the container and the resulting chemical group comparison(s).

- Use of the EPA guidance document *A Method for Determining the Compatibility of Hazardous Wastes (EPA 600-2/80-076, direct e-link provided in TOOL-115).* The guidance uses a method worksheet, and the completed worksheet may be used as the determination record.

- For simple chemical mixtures with few components, a direct comparison of data may be used. However, the review must be documented, and the basis for the generator's evaluation must be clear and complete.

- Online databases CAMEO and WISER both provide compatibility reports for chemical mixtures entered into the databases. Additional explanation or clarification of the results may be needed, depending on the specifics of your waste/mixture.

Activity 2: Waste Characterization and Classification

Please answer the following characterization and classification questions.

Correct answers can be found in the Answer Key at the end of this manual.

1. A container holding benzene (U019) was inadvertently spilled and immediately cleaned up by an authorized individual. Would the cleanup material be classified as a hazardous waste?

2. Trichloroethylene (TCE) is used in a degreasing operation in which equipment is immersed into TCE. Would the spent TCE be classified as a hazardous waste?

3. Incineration is the best-demonstrated available technology used on F-listed hazardous waste. Ash is formed as a result of the incineration. Would the ash be classified as a hazardous waste? Which hazardous waste rule applies?

4. Spent 1,1,1,2-tetrachloroethylene, typically used as a degreaser within the plant, is inadvertently introduced into a drain line leading to a settling tank outside the plant. The tank eventually is cleaned, and the residue, which forms at the bottom of the tank, is removed for disposal. Would the residue be classified as a hazardous waste? Why or why not?

5. Because of the piping design of a particular process, the hazardous waste line, which is transferring a flammable/ignitable liquid, will eventually connect with the nonhazardous waste line. What would be the waste classification at the collection point (after the lines connect)? Which hazardous waste rule applies?

Continued on next page.

6. The wastes listed in the table below are being stored in a chemical storage cabinet. Determine whether each chemical is hazardous or nonhazardous.

Bottle	Chemical	Classification
1	crystallized picric acid (shock sensitive)	
2	sodium hydroxide solution (pH 13)	
3	discarded dimethyl sulfate (commercial chemical product)	
4	domestic sewage and sewage mixtures	

Managing Containers

In addition to waste that is characterized as hazardous because of its properties or generating process, certain containers may be designated as hazardous waste.

Empty Containers

According to RCRA, a container is considered to be empty if

- it is emptied by a method commonly used for that type of container, and
- the container and residual waste are not hazardous and as much material as possible has been emptied, and
  - no more than 1 in. of material remains in the bottom of the container, or
  - <3% of material remains in a container that has a capacity <119 gal., or
  - <0.3% of material remains in a container that has a capacity >119 gal.

Containers That Once Held P-Listed Waste

For acutely hazardous waste (any P-listed waste and the following F-listed wastes: F020, F021, F022, F023, F026, F027), regardless of the volume of the residual product, the container is considered empty if the container or inner liner has been triple-rinsed using a solvent capable of removing the commercial chemical product or manufacturing chemical intermediate.

Note: *LANL recommends that containers that once held acutely hazardous waste NOT be triple-rinsed because it increases the volume of waste.*

Gas Cylinders

Gas cylinders.

Gas cylinders are considered empty when the absolute pressure approaches atmospheric. Atmospheric pressure in Los Alamos is approximately 11.3 pounds per square inch absolute (psia). Gas cylinders are given bar codes and tracked on a database maintained by the Operations Support-Packaging & Transport (OS-PT) Gas Facility group; therefore, gas cylinders should be ordered only through the Gas Facility group.

The following table lists the two options for managing gas cylinders properly.

If you have . . .	then . . .
excess gaseous material in a cylinder,	contact the OS-PT Gas Facility group for pickup.
a gas cylinder with unknown content,	manage the cylinder as hazardous waste. ***Note:*** *Gas cylinders with unknown content must be analyzed before TA-54 will accept them. Call Emergency Operations at 7-6211.*

Note: *A gas cylinder is considered empty when its gauge pressure reads <25 psi; the gas plant does not want the pressure to go below 25 pounds per square inch gauge (psig). LANL policy prohibits individual generators from venting gas cylinders.*

Aerosol Cans

A universal waste aerosol can is a container in which gas under pressure is used to aerate and dispense any material through a valve in the form of a spray or foam.

An aerosol can is considered to be no longer useable when the can is as empty as proper work practices allow, the spray mechanism no longer operates as designed, the propellant is spent, or the product is no longer used.

Aerosol cans classified as hazardous waste that have no radioactive contamination should be managed as universal waste. Specific guidelines for handling waste aerosol cans may be obtained by contacting the Environmental Compliance Programs (EPC-CP), contacting your WMC, or consulting ADESH-AP-TOOL-206, “Management of Hazardous Waste by Generators.”

Activity 3: Managing Containers

Note: *Correct answers can be found in the Answer Key at the end of this manual.*

1. You notice an empty, punctured aerosol can. Should the can be managed as a hazardous waste, nonhazardous (solid) waste, or scrap metal?

2. While walking through a machinist shop, you notice a gas cylinder with a gauge pressure of 60 psig (approximately 72 psia). Would this gas cylinder be considered empty?

3. In the same machinist shop (see # 2 above), you also notice a 35-gal. container holding approximately 6 in. of tetraethyl lead. Is this container empty? If not, what would you do to render it empty according to RCRA? Is this method encouraged at LANL?

4. You just noticed a gas cylinder with unidentifiable contents. Would this cylinder be managed as a hazardous waste? Who is responsible for having the contents within the cylinder analyzed?

Module 3: Waste Management Process

Module Objectives

When you have completed this module, you will be able to

- recognize the important elements of LANL-specific cradle-to-grave waste management activities,
- recognize the responsibilities of waste generators and WMCs at LANL,
- identify waste management documentation requirements,
- recognize additional projects and programs that may impact LANL waste management activities, and
- recognize the difference between processing and treatment.

Cradle-to-Grave Waste Management Process

The term *cradle-to-grave* refers to the scope of hazardous waste management responsibilities for any given waste stream from the time of generation through ultimate disposal. A waste generator is liable for the waste generated by his/her process through ultimate disposal of the waste. Therefore, waste generators must know the scope of work involved in the waste management process.

The cradle-to-grave waste management process includes, at a minimum,

- planning ahead,
- pollution prevention/waste minimization,
- characterization,
- generation,
- accumulation,
- packaging and transportation,
- treatment,
- storage, and
- disposal.

Planning Ahead

Before generating any type of waste, you must communicate with your facility's WMC, who will offer guidance in many areas. Critical concerns that require advance planning include

- implementing pollution prevention/waste minimization;
- assessing whether the waste generated has a disposal path before generating any type of waste;
- determining institutional, facility-, and activity-specific requirements [e.g., preparing integrated work documents (IWDs), following operating procedures, etc.];
- ensuring that once generated, wastes are contained properly; and
- calculating disposal costs.

Note: WMC roles and responsibilities will be discussed in detail later in this module.

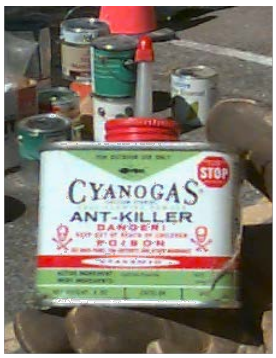
Waste Characterization

Waste characterization is the process of determining the following characteristics of a given waste stream:

- chemical,
- physical,
- biological, and
- radiological.

Accurate characterization of a waste stream helps in determining

- segregation requirements for storage,
- waste compatibility determination documentation,
- treatment alternatives, and/or
- disposal methods.



The Waste Management Division Office (WM-DO) requires generators to characterize their waste stream before the waste is generated. However, after the waste is generated, you may need to perform additional analysis to determine the characteristics. You may use *sampling and analysis or sampling and analysis supplemented by AK or AK alone* (if AK is sufficient) to determine whether the material in question should be managed as hazardous, mixed, or radioactive waste. More information on these characterization methods follows.

Sampling and Analysis

Sampling and analysis that is representative of the waste stream and is collected using approved methods is preferred by the EPA and NMED as the most defensible method of characterizing waste. Sampling and analysis must be performed in accordance with the following:

- NMED-approved laboratory analytical methods as defined in the current LANL Hazardous Waste Permit, Section 2.4;

This waste is so potentially dangerous that you should call Emergency Operations.

- USEPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*; and

- Tables C-16, C-17, and C-18 in Attachment C – *Waste Analysis Plan* of the current LANL Hazardous Waste Permit.

To request sampling and analysis services, the generator and/or WMC may complete and submit the sample request form at the following link:

https://esp-esh-as01-f5.lanl.gov/~esh19/databases/rfa_form.shtml.

Note: *If an orphaned gas cylinder (such as one with unknown content) is found, call Emergency Operations at 7-6211.*

Acceptable Knowledge

AK is a collection of information used to support the hazardous waste determination requirements and the radioactive waste acceptance requirements. To be considered, NMED and the USEPA require that AK be accurate, sufficient, and current. LANL has defined acceptable minimum requirements in the P409 guidance ADESH-AP-TOOL-111, *Waste Characterization*.

AK is a method used by the waste generator to document the characterization of waste in lieu of approved sampling and analysis. At a minimum, AK must demonstrate and communicate a detailed description of the process that generated the waste, material inputs to the process (mass-balance calculations, except for PCBs), the physical form of the waste, and the function of the materials/chemicals used in the process.

Examples of AK documentation used at LANL may include, but are not limited to, the following:

AK Sources	Examples
• Process design documents	N/A
• Final safety analysis reports (SARs), unreviewed safety questionnaire determinations (USQDs), and technical safety requirements (TSRs)	N/A
• Standard operating procedures (SOPs), hazard control plans (HCPs), activity hazard analyses (AHAs), and/or detailed operating procedures (DOPs)	N/A

AK Sources	Examples
• Other documented knowledge of processes that lists raw materials or reagents, describes the process/ experiment that uses the materials, and describes how the waste streams are generated and handled	• Waste streams that are highly similar to previously characterized waste streams if the differences in the proposed generating process are well understood and documented, the nature of the waste stream from the proposed process can be predicted with a high level of confidence, and the previously characterized waste stream is itself well characterized via data/AK. • Waste streams that contain hazardous constituents from specific, well-documented processes, such as RCRA, K-listed, waste-generating process. • Generator/subject-matter-expert (SME) clarification or characterization statements, e.g., statement that waste with residual explosive material is non-explosive, therefore non-RCRA-reactive although associated with a high-explosive process.
• Waste packaging logs completed when wastes are placed in containers	N/A
• Test plans or research project reports that describe the reagents and other raw materials used in an experiment and the byproducts and end products generated	N/A
• Laboratory notebooks that detail the research processes and materials used in an experiment and the byproducts and end products generated. o ***Note*****:** AK documents that cannot be attached entirely to the waste stream profile (WSP) in WCATS must be traceable and specifically referenced under the profile. o ***Note*****:** Applicable logbook pages or excerpts may be attached to waste disposal requests in lieu of attaching to the WSP record. However, it should be noted in the WSP if this practice is to be used.	N/A

AK Sources	Examples
• Site databases [e.g., chemical inventory database for Superfund Amendments and Reauthorization Act (SARA), Title III].	N/A
• Documented site personnel interview information.	N/A
• Correspondence, such as memoranda, letters, and telephone logs.	N/A
• Previous analytical data relevant to the waste stream, such as fingerprint analysis, spot-check procedures, or routine waste stream verification sampling and analysis data.	N/A

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, it is imperative that sampling and analysis of the waste stream be initiated and documented in WCATS in a timely fashion to avoid RCRA penalties.

Waste Generation

When waste is generated, it must be managed in accordance with state and federal regulations. A material is considered a waste if it is no longer being used for its intended purpose, has no further use, or is discarded. A waste generator is any facility, owner, or operator whose act or process produces waste or whose act first causes waste to become subject to the regulations (40 CFR 260.10).

Individual generators within LANL create a variety of waste streams and are responsible for waste characterization. Failure to characterize waste adequately can lead to RCRA violations and fines. Therefore, waste generated from LANL operations must be characterized accurately and managed appropriately.

The following table describes some of the waste streams generated from LANL operations.

Waste Stream	Description
hazardous waste	A solid waste that is listed and/or meets the criteria for being ignitable, corrosive, reactive, or toxic ***Note:*** *Hazardous waste is described in more detail in Module 3.*
mixed TSCA (MTSCA) waste	TSCA-regulated waste streams at LANL include PCB-contaminated waste streams and/or asbestos ***Note:*** *MTSCA waste contains both radioactive and TSCA components.*
transuranic (TRU) and mixed transuranic (MTRU) waste	Without regard to source or form, waste that is contaminated with alpha-emitting TRU radionuclides with half-lives >20 years and concentrations >100 nanocuries per gram at the time of assay and atomic numbers >92, as defined in DOE Order 435.1, *Radioactive Waste Management* ***Note:*** *MTRU waste contains both hazardous and TRU components.*
low-level radioactive waste (LLW)	Waste types that contain radioactivity and are not classified as high-level waste, TRU waste, spent nuclear fuel, or 11(e)(2) byproduct material (such as uranium or thorium mill tailings), as defined in DOE Order 435.1, *Radioactive Waste Management*
mixed low-level radioactive waste (MLLW)	A waste stream that contains both hazardous and low-level radioactive components ***Note:*** *A single element or compound that exhibits both hazardous and radioactive characteristics (e.g., elemental uranium) would not be considered a mixed waste.*
sanitary waste or commercial solid waste	"Municipal solid waste" generated at a private household that may be disposed of at a municipal solid waste landfill No waste generated at LANL is "municipal solid waste" Items normally classified as sanitary waste at home or commercial solid waste if generated at LANL (see note)

Note: *Commercial solid waste includes all types of solid waste generated by stores, offices, restaurants, warehouses, and other nonmanufacturing activities, excluding residential, household, and industrial wastes. These wastes may be disposed of at commercial or municipal solid waste facilities.*

Waste Accumulation

Within a 90-day area, generator treatment can be done only with written approval of the EPC-CP.

Waste generated from LANL operations is accumulated temporarily at central locations throughout LANL before being transferred to TA-54 or an offsite facility. The solid waste generated at LANL is stored temporarily in solid-waste dumpsters located throughout LANL and ultimately taken to the Los Alamos County landfill (Eco-Center) for transportation to Rio Rancho, New Mexico, for disposition.

Temporary Waste Accumulation Areas

The types of temporary waste accumulation areas at LANL are

- used oil areas,
- SAAs,
- <90-day accumulation areas,
- universal waste areas,
- New Mexico special waste storage areas,
- PCB storage areas, and
- radioactive waste storage areas.

Note: *The storage requirements for each type of temporary waste accumulation area are presented in Module 4.*

Packaging and Transportation

TRU waste being transported.

After waste is accumulated in temporary accumulation areas, it is eventually packaged and transported to an onsite or offsite receiving facility. The EPA requires hazardous waste to be packaged and transported in accordance with DOT regulations.

In addition, RCRA requires the completion of a UHWM when transporting RCRA-regulated hazardous waste.

LANL requirements for packaging and transporting hazardous or mixed waste include the following stipulations:

- a DOT-trained and -tested shipper must sign the shipping papers,
- DOT-trained and -tested personnel must perform packaging and shipping, and
- onsite and offsite shipments must meet DOT requirements.

Treatment and Storage

TRU waste storage dome at TA-54, Solid Waste Operations.

After waste is packaged to meet DOT requirements, it is transferred to a TSF, which is a facility that has a permit—or operates under interim status—to treat, store, or dispose of hazardous waste. Waste may be stored at a TSF *up to 1 year* before being moved to an offsite TSF or buried at LANL.

Note: Mixed waste may be stored over the 1-year limit if it is on the Site Treatment plan.

Treatment at a TSF

A TSF can be issued a permit to treat certain waste streams. Treatment is any method, technique, or process designed to change the physical, chemical, radiological, or biological nature of a hazardous waste.

TRU waste storage at TA-54.

At LANL, the only allowable forms of treatment are authorized by the EPC-CP for individual generators or are stipulated in the HWFP under the conditions stated in the permit.

Certain treatment procedures are illegal to perform at LANL. The following table lists two of these procedures and explains why they are illegal.

Treatment Procedure	Why It Is Illegal
evaporation	Evaporation is a viable form of treatment under certain conditions; however, evaporation of certain hazardous wastes (such as volatile organics) is illegal because of human and environmental health concerns.
Dilution	Dilution is specifically prohibited under RCRA LDRs as a substitute for the legitimate treatment for most wastes. Dilution may eliminate the waste characteristic, but it does not reduce the volume of the chemical, and the chemical may then find its way into the environment.

Note: *Before using any form of treatment, contact the EPC-CP to determine whether that particular form of treatment is allowable under EPA regulations and LANL's HWFP.*

Non-RCRA Waste Treatment at LANL

The following two waste streams are treated onsite: liquid LLW and sanitary wastewater.

Liquid LLW is treated at the radioactive liquid waste treatment facility (RLWTF) within TA-50. Sanitary wastewater is treated at the sanitary wastewater system consolidation (SWSC) facility within TA-46.

Disposal of Radioactive Material in Violation of the Waste Acceptance Criteria for the Radioactive Liquid Wastewater Treatment Facility (RLWTF)

On April 25, 2003, the Facility Management Unit 1 (FMU-1) facility manager determined that an Inorganic, Isotope, and Actinide Chemistry (C-IIAC) group chemist at the Chemistry Division RC-1 Building (TA-48-1) exceeded the waste acceptance criteria (WAC) for the RLWTF when she discarded an estimated 1.53 millicuries (1,530,000 nanocuries) of plutonium-239 (^{239}Pu) to the RLWTF on the afternoon of April 18 or April 21 while disposing of radioactive wastes. The WAC for ^{239}Pu is 100 nanocuries per liter at the point of disposal.

The chemist believed the vials required disposal for the following reasons:

- From knowledge of process, she believed the contents within the vials would meet the RLWTF WAC requirements because she thought the vials contained low-level wastes.
- The chemist thought the salts were no longer wanted or needed because of her belief that they belonged to a now-retired coworker whose name was on the top of the container.
- At the time of the coworker's retirement, the chemist questioned the coworker about chemicals/wastes the coworker might be leaving behind; the coworker stated that she had disposed of all high-level wastes.
- The chemist stated that she did not recognize a bar code on the container and did not realize that the vials were accountable items within the inventory control system; she also did not realize that the inventory within the container was now the property of the radioactive material custodian.

The C-IIAC WMC contacted the RLWTF and notified personnel of the improper disposal. The RLWTF personnel indicated that the improper disposal did not upset operations at the treatment facility and that the daily raw influent for gross alpha was below the required level of 500 nanocuries per liter for the time period of April 19 through April 23.

There were no environmental impacts as a result of this inadvertent discharge, and there were no impacts to worker health and safety.

-paraphrased from DP-ALO-LA-LANL-RADIOCHEM-2003-0009

Storage

Waste storage dome at TA-54, Area L.

Some TSFs are used only to store waste. Storage is the holding of wastes for up to 1 year, after which the waste is treated or disposed of elsewhere. One exception to this rule is approved Site Treatment Plan (STP) wastes.

The LANL STP Program has the responsibility to report mixed transuranic waste (MTRU) and mixed low-level waste (MLLW) stored at LANL to NMED. An annual report required by NMED provides a detailed listing of accumulated mixed waste stored on site for over 1 year. The RCRA Land Disposal Requirement provision prohibits the storage of hazardous waste for more than 1 year; however, the STP Program, in accordance with the Federal Facility Compliance Order (FFCO), is intended to facilitate DOE to store accumulated mixed waste for more than 1 year while identifying treatment/disposal options and working off inventory.

TA-54, the largest on-site TSF, has two designated container storage areas (CSAs): Area L and Area G. The following table describes these two CSAs and their functions.

Container Storage Area	Function
TA-54, Area L	Storage of • hazardous waste • MLLW • gas cylinders • TSCA and MTSCA waste
TA-54, Area G	Primarily storage of • TRU waste • MTRU waste • hazardous waste on Pad 7 • MLLW in Dome 224 and Pad 7

Disposal

Solid LLW disposal at TA-54 Area G.

A disposal facility is any site where hazardous waste is intentionally placed and will remain after a TSF closes.

Disposal is the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid or hazardous waste on or in the land or water.

At LANL, no RCRA hazardous and/or mixed waste is disposed of onsite. The only waste type ultimately disposed of is non-RCRA solid LLW, which is disposed of at TA-54, Area G. All other wastes types are sent offsite for treatment and/or disposal.

***Pollution prevention**, as defined by the EPA, is the use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes at the source.*

***Waste minimization**, as defined by the EPA, is the reduction of wastes at the source and the recycling of solid wastes.*

Pollution Prevention/Waste Minimization

Federal and state laws require LANL to have a pollution prevention/waste minimization program in place. Consider and/or implement pollution prevention/waste minimization opportunities for your processes to eliminate or minimize the amount of waste released into the environment.

Techniques

Pollution prevention/waste minimization techniques, including a description of each technique, are provided in the following table.

Technique	Description
Material substitution	Replacing hazardous materials with non- or less-hazardous materials; replacing disposable materials with reusable materials
Source reduction	Minimizing the amount of hazardous material that goes into a process to eliminate/reduce the volume and/or toxicity of the resulting process wastes
Treatment	Any method, technique, or process designed to change the physical, chemical, or biological nature of a hazardous waste
Reuse	Reusing a material without reprocessing it
Elimination	Modifying work practices and/or products to reduce the generation of waste
Good housekeeping	Keeping the workplace neat, clean, and free from unnecessary hazards
Hazard segregation	Keeping different kinds of wastes and incompatible chemicals separate
Chemical sharing	Trading unused/unspent chemicals with other organizations at LANL using ChemLog or eStock.
Recycling 	Using, reusing, or reclaiming usable material from waste (usually processed) ***Note:*** *Prime candidates for recycling include elemental mercury, lead-acid and gel cell batteries, unused laboratory chemicals, compressed gas cylinders, scrap metal, and solder waste.*

The Green Is Clean Program

Green Is Clean waste container.

The Green Is Clean (GIC) Program accepts waste that has been declared radiologically clean from radiological controlled areas (RCAs). To participate in the program, the waste generator must implement an administrative procedure and a training program to ensure that personnel know the correct method for segregating clean waste generated within RCAs.

To submit waste to the GIC Program, you must

- segregate the waste and label it Green Is Clean and/or place it in a GIC waste container,
- complete a GIC material disposal request form,
- send the completed form to the GIC Program, and
- send the clean waste container to a GIC facility for verification or perform the verification at the generating facility and send the information to the GIC Program contact.

Benefits

The benefits of incorporating pollution prevention/waste minimization techniques into your process include

- meeting LANS/DOE waste minimization and pollution prevention goals,
- reducing liabilities,
- reducing waste management oversight and resources,
- improving safety performance,
- improving public perception, and
- providing potential cost savings.

Assistance

To assist you in applying pollution prevention/waste minimization techniques or identifying recyclable wastes, you should

- communicate first with your WMC,
- recognize the benefits of applying pollution prevention/waste minimization techniques,
- find out about pollution prevention/waste minimization projects at LANL in which you can participate, and/or
- learn about LANL's recycling programs.

Activity 4: Pollution Prevention/Waste Minimization

Take a few minutes to think about your process. List the waste stream(s) currently generated from your process, and list at least five ways you could implement pollution prevention/waste minimization techniques into your process.

Waste streams generated from the operation:

_____

_____

_____

Pollution prevention/waste minimization techniques:

1. _____
2. _____
3. _____
4. _____
5. _____

Activity 5: True or False?

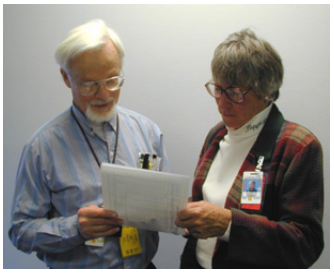
Note: *Correct answers can be found in the Answer Key at the end of this manual.*

Circle the correct answer.

T F	Generally, you are allowed to evaporate waste organic solvents as long as they are in a fume hood.
T F	As a generator of solvent-soaked rags, you are allowed to let the solvent evaporate off the rags for reuse or disposal in the trash.
T F	Low-level (radioactive) wastewater is treated onsite at the RLWTF.
T F	As a generator of corrosive liquid waste, you may dilute the waste to render it noncorrosive.
T F	Hazardous waste is disposed of at TA-54, Area L.
T F	A DOT-trained and -tested shipper must sign the UHWM.

Roles and Responsibilities

Waste Generator



Although LANL is viewed as a single generator by state and federal regulatory agencies, individual waste generators at LANL may be liable for waste management violations.

Waste must be properly managed from the moment it is generated until it is ultimately disposed of. Generators must be able to ensure that all regulated constituents in a waste stream are

- characterized,
- documented, and
- in compliance with the WAC at the TSF.

Hazardous waste generators may generate and manage only those wastes specified in the LANL HWFP.

Generator Responsibilities

Waste generators must

- provide and certify accurate, complete, and current waste characterization information, as required by the TSF's WAC, ensuring that regulated constituents in waste streams are identified;
- use the WCATS to prepare, sign, and submit waste documentation to LANL waste operations;
- segregate waste streams in accordance with the TSF's WAC;
- maintain records;
- minimize waste;
- notify facility managers (or designees) of a release of waste or wastewater to the environment or an accidental discharge to a wastewater treatment facility; and
- certify waste in accordance with the requirements of the receiving facility or facilities.

Waste Management Coordinator

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.

WMC Responsibilities

The WMC must

- serve as the primary point of contact on waste-related issues;
- ensure that the waste generated has a disposal path and is authorized to be generated;
- conduct a waste compatibility determination;
- ensure that waste is packaged, marked, labeled, and managed in accordance with the regulations, requirements, and WAC of the receiving facility or facilities;
- provide generators with guidance and assistance in ensuring regulatory compliance;
- assist generators in determining whether a waste has a path forward to disposal;

- represent waste-generating organizations during audits and assessments;
- ensure that actions are initiated to eliminate non-compliances;
- demonstrate knowledge of the waste-generating activities within the waste-generating organization and the disposal process;
- ensure that inspections of <90-day accumulation areas are performed as needed or, at a minimum, weekly;
- assist the waste-generating organization with implementing waste minimization/pollution prevention techniques;
- assist waste generators with completing waste documentation;
- use the WCATS to prepare, obtain signatures for, and submit waste documentation to LANL waste operations;
- coordinate waste transportation from their facility;
- ensure that required transportation paperwork is signed;
- maintain an auditable file of waste management documentation;
- assist in preparing and reviewing waste management sections of IWDs, waste minimization plans, management plans, and other project documentation;
- attend required training, including quarterly WMC meetings;
- disseminate waste management information to generators; and
- notify appropriate personnel of any spills, releases, leaks, or discharges.

Waste Documentation Requirements

WCATS is a software application specifically designed to facilitate management of LANL's waste from cradle to grave. The system provides the support needed for characterization, generation, processing, and shipment of all waste created at LANL.

Function	Requirements
Documenting the characterization and certification of nonradioactive and radioactive waste	• Generators will work with their WMC to characterize and document new waste streams using WCATS, both at the inception of new WSPs and at each annual reevaluation/ recertification of existing WSPs that remain in use. • The new waste stream is reviewed and approved online in WCATS. • Generators are encouraged to print and keep a copy of their waste streams. • Waste stream documentation is active for 1 year. WSPs that are

	used for active waste generation may be extended beyond 1 year if both the generator and WMC review and certify the accuracy and completeness of the waste stream annually. • Both the generator and the WMC must review and certify that the WSP content is accurate, sufficient, and current for the initial WSP issue and annually if the waste stream is unchanged and the WSP is to be extended.
Land Disposal Restrictions (LDRs) and underlying hazardous constituent (UHC) information	LDRs and UHCs are documented using WCATS for each waste stream.
Waste Disposition Request (WDR) documents waste pickup requests	• The WDR must be – entered by the WMC into the WCATS system for approved wastes (wastes with an activated WCATS waste stream number) requiring pickup. If the WDR is approved, arrangements for waste pickup are made through the contact person (usually the WMC). A WDR is required for each waste pickup location; for bulk shipments, a WDR is required for each WCATS waste stream number. An approved WDR is required for each waste container to be shipped and disposed. A WDR may address multiple waste items/container; however, each WDR must be tied to a single WSP.
UHWM Accompanying hazardous or mixed waste streams transported across public roads	• The UHWM must – be completed by a DOT-trained and -tested shipper and – accompany waste to its ultimate destination. • The owner or operator of the receiving TSF must return a copy of the UHWM to the generator as verification that the waste was received. • LANL is required to maintain copies of the UHWM for each offsite waste shipment as verification that the waste delivery reached its destination.

Abnormal Influent Enters Sanitary Wastewater

On August 26, 2004, the Facilities and Waste Operations Utilities Group (FMU-8) facility manager was notified of a continuing upset condition at the LANL Sanitary Wastewater System (SWS) plant. The upset condition affected the plant's ability to treat sanitary waste and was caused by abnormal influent entering the plant.

On or about July 17, 2004, the first slug of influent entered the plant and caused a significant die-off of the plant's biomass, including amoeba, ciliate, and rotifer populations. A total biomass die-off could result in LANL noncompliances with New Mexico Water Quality and National Pollutant Discharge Elimination System permits, together with associated fines of $125,000 per day.

At the time of this event, KSL operated the sanitary SWS plant, which received sanitary waste from LANL facilities across the 43-square-mile site.

DP-ALO-LA-LANL-PHYSTECH-2004-0004

Module 4: Waste Accumulation Areas

Module Objectives

When you have completed this module, you will be able to

- recognize the types of temporary waste accumulation areas at LANL,
- recognize the general requirements for temporary waste accumulation areas at LANL,
- recognize the specific requirements for temporary waste accumulation areas at LANL,
- recognize the purpose of performing inspections,
- identify noncompliance areas by inspecting a mock setup of a temporary waste accumulation area located in the classroom, and
- recognize initial response recommendations for leaks and spills.

Types of Temporary Waste Accumulation Areas

Wastes generated at LANL are typically stored in temporary waste accumulation areas before the waste is moved to another location for treatment and/or long-term storage or disposal.

The following table describes the types of temporary waste accumulation areas at LANL:

Types of Temporary Accumulation Areas	Description
Used oil area	An area dedicated for the temporary 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]." For assistance in determining whether you have used oil, contact your WMC.
Satellite accumulation area (SAA)	An accumulation area for hazardous or mixed waste that is located to serve a process, room, or suite of rooms where waste is generated.
<90-day accumulation area	An accumulation area where hazardous or mixed waste may be stored for up to 90 days without a permit; that is, no hazardous or mixed waste may remain at such a storage area more than 90 days.
Universal waste area	An area that • is dedicated to specific hazardous waste types that are subject to universal waste requirements and • includes certain types of batteries, pesticides, thermostats, lamps, and aerosol cans.
New Mexico special waste storage area	A storage 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.
PCB storage area	A location established for the storage of items contaminated with PCBs; may be • general—for storage up to 90 days or • temporary—for storage up to 30 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.
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, as long as this is done in a timely manner. Staging must not exceed 90 days.

General Requirements for Temporary Waste Accumulation Areas

Setting Up a Temporary Waste Accumulation Area

Before setting up a temporary waste accumulation area, first consider how much waste is being generated over time and the type of waste being generated. Then you must

- contact the radiological control technician (RCT) and the WMC in your area for the storage of radioactive or mixed wastes,
- register the hazardous or mixed waste accumulation area with the EPC-CP,
- register radioactive waste areas according to the *Radioactive Waste Certification Program*, P930-2 (WCP), and
- abide by applicable fire codes.

The accumulation area should be free of ignition sources and should preferably be dry and sheltered.

Container Requirements

Waste containers must be

- in good condition,
- properly labeled,
- closed when not in use,
- compatible with the waste generated, and
- segregated if some waste streams are incompatible with others.

Note: *Containers holding liquid wastes in temporary waste accumulation areas must have secondary containment.*

Labeling Requirements

Container labels must

- (only for SAAs) include the generator's name and the WCATS waste profile ID number or number pending, or a logbook;
- list the waste constituents (no chemical symbols or abbreviations) and the words *Hazardous Waste* if the container holds a hazardous waste;
- be legible and not faded;
- (<90 days) have the words *Hazardous Waste* on the label;
- include the words *Hazardous Waste* and *Pending Analysis* for waste that is pending analysis (such as if waste constituents are unknown and the waste will be sent for sampling and analysis);
- include the words *Radioactive* and *Hazardous Waste* if the container holds mixed waste; and
- include the words *Radioactive Waste* if the container holds low-level waste or TRU.

Note: *If waste is sampled and analyzed via the WM-DO and the results indicate that the waste stream is nonhazardous, remove the Hazardous Waste label from the container.*

If the results indicate that the waste stream is hazardous, label with the appropriate WCATS waste profile ID number.

Signage Requirements

Signs indicating the type of temporary waste accumulation area must be posted at each area and visible to anyone entering the area from any direction.

Note: *Contact your WMC to obtain labels and signs.*

Segregation Requirements

Segregation requirements include the following stipulations:

- hazardous wastes and other waste types stored in an accumulation area must be clearly segregated if some waste constituents are incompatible with others;
- wastes must be segregated by means of a dike, berm, wall, or other barrier; and
- liquids and solids must be packaged separately.

Specific Requirements for Temporary Waste Accumulation Areas

The following tables outline the specific requirements for each type of temporary accumulation area.

Used Oil Area Requirements	
Volume Limits	If 10 gal. or more is accumulated in a single location, a log sheet must be maintained with (1) the location where the oil was generated and (2) the generator's name.
Labeling	The label must include the words *Used Oil*, regardless of the quantity.
Time Constraints	There are no time constraints.
Location	The area must be registered with the EPC-CP if more than 10 gal. is accumulated in a single location.
Inspections	Inspections are not required. *Note: The EPC-CP will conduct periodic inspections of these areas.*
Signs/Postings	Signs/postings are not required.

PCB large mark [M_L].

Used-oil label.

	Satellite Accumulation Area	<90-Day Accumulation Area	Universal Waste Area	NM Special Waste Storage Area
Volume Limits	• 55-gal. limit for hazardous or mixed waste or • 1-qt limit for acutely hazardous waste	No volume limits	No volume limits	No volume limits
Labeling	Label must include • the words *Hazardous Waste* **and** a list of major constituents • the date the excess began, if volume limits are exceeded • the generator's name and the WCATS waste profile ID number or number pending (must be on the label or in the inventory log)	Label must include • the accumulation start date • the words *Hazardous Waste*	Label must include • the accumulation start date • the words *Universal Waste* • the appropriate terms (batteries, pesticides, mercury thermostats, lamps, aerosol cans)	Label must include • the accumulation start date • the words *New Mexico Special Waste* • a list of container contents
Time Constraints	If volume limits are exceeded, must transfer the waste within 3 days	Waste must not remain in excess of 90 days ***Note:*** *The WDR must be submitted on or before day 45.*	1-year storage limit ***Note:*** *The WDR must be submitted on or before month 6.*	Waste must not remain in excess of 90 days ***Note:*** *The WDR must be submitted on or before day 45.*
Location	• Must be located at or near the point of generation • Must be under the control of the generator • Must be registered with the EPC-CP	• Must have a minimum of 2-ft-aisle spacing • Must have an emergency/site-specific plan and a contingency plan • Must have emergency and decontamination equipment available • Must be registered with the EPC-CP	Must be set up in an approved storage location that is registered with the EPC-CP	• Must be set up in an approved storage area that is registered with the EPC-CP • Waste must not be disposed of in a solid-waste dumpster
Inspections	Formal inspections [using the Inspection Record Form (IRF)] are not required	• Weekly or • Daily, if waste is actively managed using the IRF	Formal inspections (using the IRF) are not required	Formal inspections (using the IRF) are not required
Signs/ Posting	Must have a sign with the words *Hazardous Waste Satellite Accumulation Area*	Must have a sign with the words *Hazardous Waste <90-Day Accumulation Area*	Must have a sign with the words *Universal Waste Area*	Must have a sign with the words *New Mexico Special Waste Area*

	PCB Storage Area (General)	PCB Storage Area (Temporary)	Radioactive Waste Storage Area (Low-Level Waste)
Volume Limits	No volume limits	No volume limits	No volume limits
Labeling	Label must include • the date of removal from service • the PCB item ID number	Label must include • the date of removal from service • the PCB item ID number ***Note:*** *Ballasts must be in covered, labeled containers with the date of removal from service on the label.*	Label must include • a list of container contents • the word *Radioactive* • the accumulation start date
Time Constraints	Waste must not remain in excess of 90 days ***Note:*** *All nonradioactive PCB waste must be disposed of within 1 year after generation.*	Waste must not remain in excess of 30 days	• Storage: may not exceed 1 year • Staging: may not exceed 90 days ***Note:*** *Radioactive PCB waste may be stored for more than 1 year if there is no path forward.*
Location	• Must have adequate roof and walls to prevent rain from entering • Must be located at or above the 100-yr flood plain • Floor area must have a minimum 6-in.-high, continuous, smooth, nonporous concrete curb • Must have written records of storage dates and amounts of PCB stored • Must have secondary containment • Must be registered with the EPC-CP	For PCBs >50 parts per million (ppm), must have a site-specific spill prevention, control, and countermeasures plan near the area	Must be located in a weather-protected area as appropriate
Inspections	Every 30 days	Every 30 days	Inspections are required monthly
Signs/ Posting	Area must be posted with a PCB large mark [M_L]	Area must be posted with a PCB large mark [M_L]	Must have appropriate warning signs in accordance with P121, *Radiation Protection*

Inspections

Because of the consequences associated with mismanagement of hazardous and/or mixed waste, waste generators must comply with LANL waste management policies and procedures, as well as federal and state regulations. Internal and external inspections are performed throughout the year to ensure environmental compliance and to help minimize findings by external inspections.

Purpose of Inspections

Internal and external waste management inspections facilitate

- the protection of human health and the environment,
- LANL compliance with federal and state laws and regulations,
- waste minimization/pollution prevention practices for specific LANL processes, and
- the ID and correction of problems in hazardous and mixed-waste accumulation areas.

*As defined within the LANS/DOE contract, an **inspection** is a visit by RCRA Compliance Group personnel to an individual waste accumulation or storage area with a specific site ID number for the purpose of inspecting the handling and management of waste stored in that area for compliance with RCRA regulations.*

Radioactive Waste Self-Assessment Process

P930-2, *Radioactive Waste Certification Program*, states that

> WCP personnel assess LANL's radioactive waste facilities against the DOE Order 435.1 waste certification requirements summarized in the Waste Certification Tool of P409, *Waste Management*.
>
> These personnel also assess waste management activities and any associated items (e.g., labels, tags, signage, areas, systems) to verify DOE Order 435.1 compliance.

The EPC-CP Self-Assessment Process

The EPC-CP members represent LANL during audits and inspections and perform internal self-assessment of units to identify potential regulatory deviations before official audits and inspections. The EPC-CP also maintains a Hazardous Waste Storage Area Self-Assessment System to record deviations and corrections.

The RCRA Self-Inspection Checklist is shown on the following two pages.

HAZARDOUS WASTE SELF-INSPECTION CHECKLIST

SITE ID #	TA	BLDG	ROOM	GROUP	DATE	☐ SAA ☐< 90 ☐ UWA ☐ UOA

☐ No concerns ☐ With concerns ☐ Inactive/Removed ☐ Active but not storing ☐ Comments

WMC: Other:

GENERAL REQUIREMENTS	
1. The generator has initiated a hazardous waste determination.	☐ YES ☐ NO ☐ NA
2. Containers are in good condition.	☐ YES ☐ NO ☐ NA
3. Waste is compatible with containers.	☐ YES ☐ NO ☐ NA
4. Containers are closed.	☐ YES ☐ NO ☐ NA
5. Hazardous waste containers are marked with the words "HAZARDOUS WASTE, UNIVERSAL WASTE or USED OIL".	☐ YES ☐ NO ☐ NA
A. Mixed waste is labeled as "RADIOACTIVE".	☐ YES ☐ NO ☐ NA
6. Constituents of waste are listed on container.	☐ YES ☐ NO ☐ NA
7. A. Waste spills or leaks have been cleaned up.	☐ YES ☐ NO ☐ NA
B. The resultant clean up materials have been handled as hazardous waste or used oil, as appropriate.	☐ YES ☐ NO ☐ NA
8. Incompatible wastes are properly segregated.	☐ YES ☐ NO ☐ NA
9. EPC-CP has been notified of the location of the hazardous waste accumulation areas or any changes in the area. (LANL Policy)	☐ YES ☐ NO ☐ NA
10. An owner is identified for all waste.	☐ YES ☐ NO ☐ NA
11. Hazardous waste is stored in a container.	☐ YES ☐ NO ☐ NA
12. Hazardous waste was properly disposed/dispositioned.	☐ YES ☐ NO ☐ NA
13. Generator treatment is occurring and generator is complying with 40 CFR 262.34.	☐ YES ☐ NO ☐ NA
UNIVERSAL WASTE	
1. The universal waste area sign is prominently posted and visible	☐ YES ☐ NO ☐ NA
2. Batteries have an accumulation start date on containers.	☐ YES ☐ NO ☐ NA
3. Batteries have not exceeded the one year time limit.	☐ YES ☐ NO ☐ NA
4.. Lamps/bulbs have an accumulation start date on containers	☐ YES ☐ NO ☐ NA
5. Lamps/bulbs have not exceeded the one year time limit.	☐ YES ☐ NO ☐ NA
6. Lamps/bulbs containers are closed.	☐ YES ☐ NO ☐ NA
7. Mercury containing equipment has an accumulation start date on containers.	☐ YES ☐ NO ☐ NA
8. Mercury containing equipment has not exceeded the one year time limit.	☐ YES ☐ NO ☐ NA
9. Pesticides have an accumulation start date on containers.	☐ YES ☐ NO ☐ NA
10. Pesticides have not exceeded the one year time limit.	☐ YES ☐ NO ☐ NA
11. Pesticides containers are closed.	☐ YES ☐ NO ☐ NA
12. Aerosol cans have an accumulation start date on containers.	☐ YES ☐ NO ☐ NA
13. Aerosol cans have not exceeded the one year limit.	☐ YES ☐ NO ☐ NA
14. Aerosol cans containers are closed.	☐ YES ☐ NO ☐ NA
SATELLITE ACCUMULATION AREA	
1. The waste is being accumulated "at or near the point of generation".	☐ YES ☐ NO ☐ NA
2. The waste is "under the control of the operation of the process generating th	☐ YES ☐ NO ☐ NA
3. The users of the SAA have an inventory system or their names and waste pr numbers on containers.	☐ YES ☐ NO ☐ NA
4. The SAA has administrative controls.	☐ YES ☐ NO ☐ NA
5. The SAA outside has physical controls.	☐ YES ☐ NO ☐ NA
6. The waste has not exceeded the 55 gallons of hazardous waste or 1 quart of	☐ YES ☐ NO ☐ NA

acutely hazardous waste. A. The waste volume has been exceeded, and the containers are marked with the date the excess began accumulating.	☐ YES ☐ NO ☐ NA
B. The excess amount has been held for less than 3 days.	☐ YES ☐ NO ☐ NA
7. The satellite accumulation area sign is prominently posted and visible.	☐ YES ☐ NO ☐ NA
8. Hazardous waste was not moved from one SAA to another SAA.	☐ YES ☐ NO ☐ NA
9. Owner/operator/generator is an active user of the SAA.	☐ YES ☐ NO ☐ NA
10. An owner is identified for all waste	☐ YES ☐ NO ☐ NA
< 90 DAY	
1. There is an accumulation start date on every container.	☐ YES ☐ NO ☐ NA
2. The waste has not exceeded the 90 day time limit.	☐ YES ☐ NO ☐ NA
3. The accumulation area is inspected at least weekly or when adding or removing waste.	☐ YES ☐ NO ☐ NA
4. Deficiencies are noted and being corrected in a timely manner.	☐ YES ☐ NO ☐ NA
5. Inspection records are complete	
6. The < 90 day accumulation area sign is prominently posted and visible.	☐ YES ☐ NO ☐ NA
7. Required equipment is present: Spill control equipment. Emergency equipment. Communication equipment, and Decontamination equipment.	 ☐ YES ☐ NO ☐ NA ☐ YES ☐ NO ☐ NA ☐ YES ☐ NO ☐ NA ☐ YES ☐ NO ☐ NA
8. There is adequate aisle space between containers.	☐ YES ☐ NO ☐ NA
9. The operators/inspectors have completed and are up-to-date on the required training.	☐ YES ☐ NO ☐ NA
10. A copy of the Contingency Plan is at the accumulation area. B. There is an Emergency Contact List/Site Specific Plan	☐ YES ☐ NO ☐ NA ☐ YES ☐ NO ☐ NA

Signature _____ Date _____

Comments:

Revised 9/19/2016

Activity 6: Inspecting a Satellite Accumulation Area

You will inspect the SAA located at the back of the classroom and record below as many waste management violations as you can find. Be prepared to share your findings with the class.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Responding to Leaks and Spills

The Hazardous Materials Response group provides 24-hour emergency response for onsite and offsite incidents involving hazardous materials (e.g., fires, spills, or explosions). In general, if a hazardous waste leak or spill occurs, contact your supervisor and call 911 or contact Emergency Operations at 7-6211.

Leaks and spills of hazardous and mixed waste must be cleaned up immediately, and the cleanup material must be managed as a hazardous or mixed waste.

Note: *If a mixed waste spill occurs, contact your supervisor, RCT, and WMC, and call 911 or contact Emergency Operations at 7-6211.*

Notes . . .

Answer Key

Activity 1: Test Your Knowledge of LANL Waste Requirements (p. 13)

1. You have discovered several cans of "canned air." Are these considered hazardous waste at LANL? **Yes. Aerosol cans are managed as hazardous waste at LANL.** In your home? **No. You may dispose of aerosol cans in the trash when at home.**
2. Are you allowed to toss an alkaline battery into a trash can at LANL? **Yes. Alkaline batteries are NOT hazardous waste.**
3. A LANL employee in your area has thrown a half-empty bottle of nail polish remover into a trash can in your area. Would this be a violation of hazardous waste regulations? **Yes. Nail polish remover must be managed as hazardous waste at LANL.**
4. LANL maintenance workers have just replaced the fluorescent tubes in the light fixtures in your office. Can the burned-out tubes be thrown into a dumpster, or must they be managed as hazardous waste? **Spent fluorescent tubes must be managed as hazardous waste at LANL.**
5. Uninterruptible power supply (UPS) units are attached to network servers in your office. These units use lead-acid batteries. What is the proper way to manage these batteries once they are spent? **Lead-acid batteries are recycled at LANL.**
6. What kinds of items are recycled at LANL? Are recycled items subject to hazardous waste regulations? **Office paper, plastic bottles, aluminum cans, and other items are recycled at LANL. Items being recycled are subject to hazardous waste regulations.**
7. You are a chemist at LANL who regularly works with acid solutions. Are you allowed to neutralize these solutions, or must they be managed as hazardous waste? **You are NOT allowed to neutralize solutions. Very little treatment is done at LANL. Chemical solutions that meet regulatory definitions of hazardous waste must be managed accordingly.**

8. If you miss the weekly waste collection at your home, are you allowed to bring your household waste to LANL and throw it into a LANL dumpster? **No. Household waste is exempt from hazardous waste regulations, but LANL waste is not. If household waste is mixed with LANL waste in LANL dumpsters, regulators may find LANL in violation of hazardous waste regulations.**
9. You have leftover paint from a project in your work area. Are you allowed to throw the half-empty paint can into a LANL dumpster, or must you manage the paint as a hazardous waste? **You are NOT allowed to throw the paint can in a LANL dumpster. The paint must be managed as a hazardous waste at LANL.**
10. How can "green purchasing" reduce the amount of waste generated at LANL?

    a. To reduce leftovers, purchase only what you will use.

    b. Purchase from a vendor who will take the product back once it is used (such as lead-acid batteries).

    c. Purchase products that do not contain hazardous constituents.

Activity 2: Waste Characterization and Classification (p. 34)

1. A container holding benzene was inadvertently spilled and immediately cleaned up by an authorized individual. Would the cleanup material be classified as a hazardous waste? **Yes.**
2. TCE—trichloroethylene—is used in a degreasing operation in which equipment is immersed into TCE. Would the spent TCE be classified as a hazardous waste? **Yes.**
3. Incineration is the best-demonstrated available technology used on F-listed hazardous waste. Ash is formed as a result of the incineration. Would the ash be classified as a hazardous waste? **Yes.** Which hazardous waste rule applies? **Derived-From Rule.**
4. Spent 1,1,1,2-tetrachloroethylene, typically used as a degreaser within the plant, is inadvertently introduced into a drain line leading to a settling tank outside the plant. The tank eventually is cleaned, and the residue, which forms at the bottom of the tank, is removed for disposal. Would the residue be classified as a hazardous waste? **Yes.** Why or why not? **Because 1,1,1,2-tetrachlorethylene is on the F-listing, the sludge will maintain the F-listing based on the Derived-From Rule. Therefore, the sludge must be managed as an F-listed hazardous waste.**

5. Because of the piping design of a particular process, the hazardous waste line, which is transferring a flammable/ ignitable liquid, will eventually connect with the nonhazardous waste line. What would be the waste classification at the collection point (after the lines connect)? **Hazardous if the liquid waste still exhibits the flammable/ignitable characteristic.** Which hazardous waste rule applies? **Mixture Rule.**

The wastes listed in the table below are being stored in a chemical storage cabinet. Determine whether each chemical is hazardous or nonhazardous.

Bottle	Chemical	Classification
1	crystallized picric acid (shock sensitive)	Hazardous (D003)
2	sodium hydroxide solution (pH 13)	Hazardous (D002)
3	discarded dimethyl sulfate (commercial chemical product)	Hazardous (U103)
4	domestic sewage and sewage mixtures	Solid Waste Exclusion

Activity 3: Managing Containers (p. 38)

1. You notice an empty, punctured aerosol can. Should the can be managed as a hazardous or nonhazardous solid waste? **Nonhazardous—solid waste or recycle.**
2. While walking through a machinist shop, you notice a gas cylinder with a gauge pressure of 60 psig (approximately 72 psia). Would this gas cylinder be considered empty? **No, because the absolute pressure is not near atmospheric.**
3. In the same machinist shop (see # 2 above), you also notice a 35-gal. container holding approximately 6 in. of tetraethyl lead. Is this container empty? **No, because the container is holding more than 1 in. of tetraethyl lead.** If not, what would you do to render it empty according to RCRA? **Triple rinse with a solvent.** Is this method encouraged at LANL? **No.**
4. You just noticed a gas cylinder with unidentifiable contents. Would this cylinder be managed as a hazardous waste? **Yes.** Who is responsible for having the contents within the cylinder analyzed? **The generating organization.**

Activity 4: Waste Characterization and Classification (p.53)

1. A container holding benzene was inadvertently spilled and immediately cleaned up by an authorized individual. Would the cleanup material be classified as a hazardous waste? **Yes.**
2. TCE—trichloroethylene—is used in a degreasing operation in which equipment is immersed into TCE. Would the spent TCE be classified as a hazardous waste? **Yes.**
3. After immersing the piece of equipment (see # 2 above), the machinist used a Kimwipe to dry the equipment. When discarded, would the Kimwipe be considered a hazardous waste? Which hazardous waste rule applies? **Mixture Rule.**
4. Incineration is the best demonstrated available technology used on F-listed hazardous waste. As a result of the incineration, ash is formed. Would the ash be classified as a hazardous waste? Which hazardous waste rule applies? **Derived-From Rule.**
5. Spent 1,1,1,2-tetrachloroethylene, typically used as a degreaser within the plant, is inadvertently introduced into a drain line leading to a settling tank outside the plant. Eventually the tank is cleaned and the residue, which forms at the bottom of the tank, is removed for disposal. Would the residue be classified as a hazardous waste? **Yes.** Why or why not? **Because 1,1,1,2-tetrachlorethylene is on the F-listing, the sludge will maintain the F-listing based upon the derived-from rule. Therefore, the sludge must be managed as an F-listed hazardous waste.**
6. Because of the piping design of a particular process, the hazardous waste line, which is transferring a flammable/ ignitable liquid, will eventually connect with the nonhazardous waste line. What would the waste classification be at the collection point (after the lines connect)? **Hazardous if the liquid waste still exhibited the flammable/ignitable characteristic.** Which hazardous waste rule applies? **Mixture Rule.**

Activity 4—continued

The wastes listed in the table below are being stored in a chemical storage cabinet. Determine whether each chemical is hazardous or nonhazardous.

Bottle	Chemical	Classification
1	crystallized picric acid (shock sensitive)	Hazardous (D003)
2	sodium hydroxide solution (pH 13)	Hazardous (D002)
3	discarded dimethyl sulfate (commercial chemical product)	Hazardous (U103)
4	domestic sewage and sewage mixtures	Solid Waste Exclusion

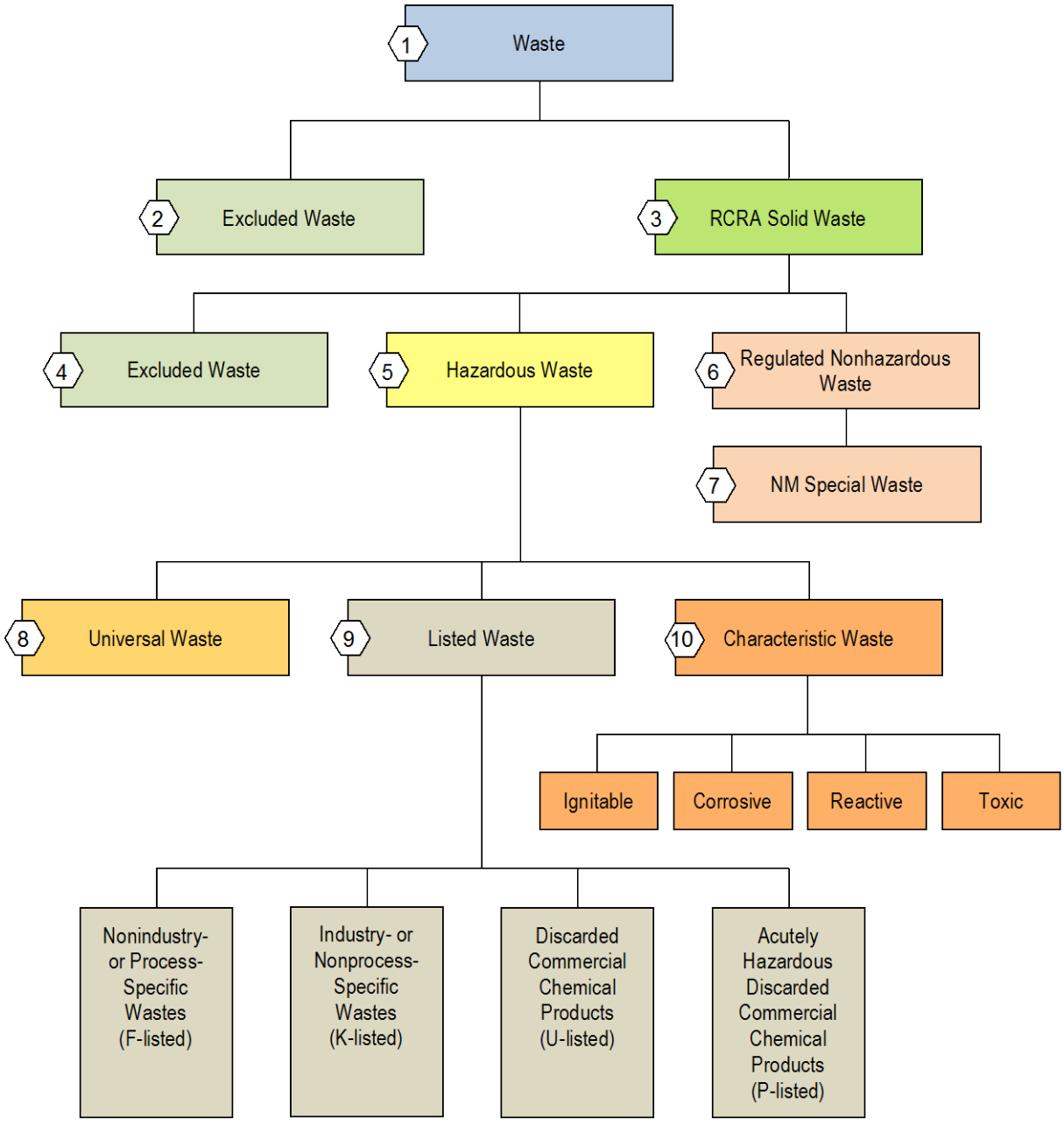
Activity 5: True or False? (p. 54)

False	Generally, you are allowed to evaporate waste organic solvents, as long as they are in a fume hood.
False	As a generator of solvent-soaked rags, you are allowed to let the solvent evaporate off the rags for reuse or disposal in the trash.
True	Low-level (radioactive) wastewater is treated onsite at the RLWTF.
False	As a generator of corrosive liquid waste, you may dilute the waste to render it noncorrosive.
False	Hazardous waste is disposed of at TA-54, Area L.
True	A DOT-trained and -tested shipper must sign the UHWM.

Appendix A. Hazardous Waste Determination Process

Hazardous Waste Determination Process

The following chart illustrates the hazardous waste determination process.



Characteristic Waste

The Environmental Protection Agency (EPA) developed two primary 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).

D001: Characteristic of Ignitability. (40 CFR 261.21)

A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

- It is 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).
- It is not a liquid and is capable, under standard temperature and pressure, 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.
- It is an ignitable compressed gas.
- It is an oxidizer.

D002: Characteristic of Corrosivity. (40 CFR 261.22)

A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

- It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5 (strong acid or strong base).
- It is a liquid and corrodes steel at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F).

D003: Characteristic of Reactivity. (40 CFR 261.23)

A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

- It is normally unstable and readily undergoes violent change without detonating.

- It reacts violently with water.
- It forms potentially explosive mixtures with water.
- When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
- It is a cyanide or sulfide bearing waste that, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
- It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
- It is readily capable of detonation or explosive decomposition or of reaction at standard temperature and pressure.
- It is a forbidden explosive as defined in 49 CFR 173.51 or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88.

D004 through D043: Characteristic of Toxicity. (40 CFR 261.24)

- A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure (TCLP), the extract from a representative sample of the waste contains any of the contaminants listed in the following table at the concentration equal to or greater than the respective value given in that table.
- A solid waste that exhibits the characteristic of toxicity has the EPA Hazardous Waste Number specified in the following table, which corresponds to the toxic contaminant, causing it to be hazardous.

Table 1 lists all regulated characteristic toxic wastes.

Table 1: Maximum Concentration of Contaminants for the "Toxicity" Characteristic as Determined by the TCLP ("D" List)

Hazardous 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 2. Each waste code incorporates the letter designation for each list.

Table 3 lists the hazard code definitions, which are the basis for listing the classes or types of listed wastes.

Table 2: Listed Wastes

EPA List	Definition
F-Listed[a] (see **Table 4**)	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 5)**	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 **Error! Reference source not found.6**)	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 7**)	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)

[a] F and K codes can be used only if the source of the waste is known.
[b] P and U codes 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 3: Hazard Codes for Listed Wastes

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. The absence of a hazard code indicates that the compound is listed for acute toxicity.

Table 4: Hazardous Waste Generated by Generic Processes (F Listed) (40 CFR 261.31)		
Industry and EPA 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)
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process	(R, T)
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations	(R, T)
F012	Quenching waste water treatment sludges from metal heat treating operations where cyanides are used in the process	(T)
F019	Wastewater treatment sludges from the chemical conversion coating of aluminum, except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process. Wastewater treatment sludges from the manufacturing of motor vehicles using a zinc phosphating process will not be subject to this listing at the point of generation if the wastes are not placed outside on the land before being shipped to a landfill for disposal and are either disposed of in a Subtitle D municipal or industrial landfill unit that is equipped with a single clay liner and is permitted, licensed or otherwise authorized by the state; or disposed of in a landfill unit subject to, or otherwise meeting, the landfill requirements in §258.40, §264.301 or §265.301. For the purposes of this listing, motor vehicle manufacturing is defined in paragraph (b)(4)(i) of this section, and (b)(4)(ii) of this section describes the recordkeeping requirements for motor vehicle manufacturing facilities	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)	(H)

F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives	(H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions	(H)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol.)	(H)
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free-radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in §261.31 or §261.32.)	(T)
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free-radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution	(T)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions	(H)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene sythesized from prepurified 2,4,5-trichlorophenol as the sole component.)	(H)
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027	(T)
F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with §261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol	(T)
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol	(T)
F035	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol	(T)
F037	Petroleum refinery primary oil/water/solids separation sludge—Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units), and K051 wastes are not included in this listing. This listing does include residuals generated from processing or recycling oil-bearing hazardous secondary materials excluded under §261.4(a)(12)(i), if those residuals are to be disposed of	(T)

F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge—Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in dissolved air floatation (DAF) units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units), and F037, K048, and K051 wastes are not included in this listing	(T)
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.)	(T)

Table 5: Hazardous Wastes from Specific Sources (K Listed) (40 CFR 261.32)

Industry and EPA hazardous waste #	Hazardous waste	Hazard code
Wood preservation		
K001	Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol	(T)
Inorganic pigments		
K002	Wastewater treatment sludge from the production of chrome yellow and orange pigments	(T)
K003	Wastewater treatment sludge from the production of molybdate orange pigments	(T)
K004	Wastewater treatment sludge from the production of zinc yellow pigments	(T)
K005	Wastewater treatment sludge from the production of chrome green pigments	(T)
K006	Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated)	(T)
K007	Wastewater treatment sludge from the production of iron blue pigments	(T)
K008	Oven residue from the production of chrome oxide green pigments	(T)
Organic chemicals		
K009	Distillation bottoms from the production of acetaldehyde from ethylene	(T)
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)
K013	Bottom stream from the acetonitrile column in the production of acrylonitrile	(R, T)
K014	Bottoms from the acetonitrile purification column in the production of acrylonitrile	(T)
K015	Still bottoms from the distillation of benzyl chloride	(T)
K016	Heavy ends or distillation residues from the production of carbon tetrachloride	(T)
K017	Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin	(T)
K018	Heavy ends from the fractionation column in ethyl chloride production	(T)
K019	Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production	(T)
K020	Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production	(T)
K021	Aqueous spent antimony catalyst waste from fluoromethanes production	(T)
K022	Distillation bottom tars from the production of phenol/acetone from cumene	(T)
K023	Distillation light ends from the production of phthalic anhydride from naphthalene	(T)
K024	Distillation bottoms from the production of phthalic anhydride from naphthalene	(T)
K025	Distillation bottoms from the production of nitrobenzene by the nitration of benzene	(T)
K026	Stripping still tails from the production of methy ethyl pyridines	(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)
K083	Distillation bottoms from aniline production	(T)
K085	Distillation or fractionation column bottoms from the production of chlorobenzenes	(T)
K093	Distillation light ends from the production of phthalic anhydride from ortho-xylene	(T)
K094	Distillation bottoms from the production of phthalic anhydride from ortho-xylene	(T)
K095	Distillation bottoms from the production of 1,1,1-trichloroethane	(T)
K096	Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane	(T)
K103	Process residues from aniline extraction from the production of aniline	(T)
K104	Combined wastewater streams generated from nitrobenzene/aniline production	(T)
K105	Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes	(T)
K107	Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines	(C,T)
K108	Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides	(I,T)
K109	Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides	(T)
K110	Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides	(T)
K111	Product washwaters from the production of dinitrotoluene via nitration of toluene	(C,T)
K112	Reaction byproduct water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene	(T)
K113	Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene	(T)
K114	Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene	(T)
K115	Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene	(T)
K116	Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine	(T)
K117	Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene	(T)
K118	Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene	(T)
K136	Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene	(T)
K149	Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups, (This waste does not include still bottoms from the distillation of benzyl chloride.)	(T)
K150	Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha-(or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups	(T)
K151	Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups	(T)

K156	Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)	(T)
K157	Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)	(T)
K158	Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)	(T)
K159	Organics from the treatment of thiocarbamate wastes	(T)
K161	Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.)	(R,T)
K174	Wastewater treatment sludges from the production of ethylene dichloride or vinyl chloride monomer (including sludges that result from commingled ethylene dichloride or vinyl chloride monomer wastewater and other wastewater), unless the sludges meet the following conditions: (i) they are disposed of in a subtitle C or non-hazardous landfill licensed or permitted by the state or federal government; (ii) they are not otherwise placed on the land before final disposal; and (iii) the generator maintains documentation demonstrating that the waste was either disposed of in an onsite landfill or consigned to a transporter or disposal facility that provided a written commitment to dispose of the waste in an offsite landfill. Respondents in any action brought to enforce the requirements of subtitle C must, upon a showing by the government that the respondent managed wastewater treatment sludges from the production of vinyl chloride monomer or ethylene dichloride, demonstrate that they meet the terms of the exclusion set forth above. In doing so, they must provide appropriate documentation (e.g., contracts between the generator and the landfill owner/operator, invoices documenting delivery of waste to landfill, etc.) that the terms of the exclusion were met	(T)
K175	Wastewater treatment sludges from the production of vinyl chloride monomer using mercuric chloride catalyst in an acetylene-based process	(T)
K181	Nonwastewaters from the production of dyes and/or pigments (including nonwastewaters commingled at the point of generation with nonwastewaters from other processes) that, at the point of generation, contain mass loadings of any of the constituents identified in paragraph (c) of this section that are equal to or greater than the corresponding paragraph (c) levels, as determined on a calendar year basis. These wastes will not be hazardous if the nonwastewaters are (i) disposed in a Subtitle D landfill unit subject to the design criteria in §258.40; (ii) disposed in a Subtitle C landfill unit subject to either §264.301 or §265.301; (iii) disposed in other Subtitle D landfill units that meet the design criteria in §258.40, §264.301, or §265.301; or (iv) treated in a combustion unit that is permitted under Subtitle C or an onsite combustion unit that is permitted under the Clean Air Act. For the purposes of this listing, dyes and/or pigments production is defined in paragraph (b)(1) of this section. Paragraph (d) of this section describes the process for demonstrating that a facility's nonwastewaters are not K181. This listing does not apply to wastes that are otherwise identified as hazardous under §§261.21–261.24 and 261.31–261.33 at the point of generation. Also, the listing does not apply to wastes generated before any annual mass loading limit is met	(T)
Inorganic chemicals		
K071	Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used	(T)
K073	Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production	(T)
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)
K177	Slag from the production of antimony oxide that is speculatively accumulated or disposed, including slag from the production of intermediates (e.g., antimony metal or crude antimony oxide)	(T)
K178	Residues from manufacturing and manufacturing-site storage of ferric chloride from acids formed during the production of titanium dioxide using the chloride-ilmenite process	(T)
Pesticides		
K031	Byproduct salts generated in the production of MSMA and cacodylic acid	(T)
K032	Wastewater treatment sludge from the production of chlordane	(T)
K033	Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane	(T)
K034	Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane	(T)
K035	Wastewater treatment sludges generated in the production of creosote	(T)
K036	Still bottoms from toluene reclamation distillation in the production of disulfoton	(T)
K037	Wastewater treatment sludges from the production of disulfoton	(T)
K038	Wastewater from the washing and stripping of phorate production	(T)
K039	Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate	(T)
K040	Wastewater treatment sludge from the production of phorate	(T)
K041	Wastewater treatment sludge from the production of toxaphene	(T)
K042	Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T	(T)
K043	2,6-dichlorophenol waste from the production of 2,4-D	(T)
K097	Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane	(T)
K098	Untreated process wastewater from the production of toxaphene	(T)
K099	Untreated wastewater from the production of 2,4-D	(T)
K123	Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salt	(T)
K124	Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts	(C, T)
K125	Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts	(T)
K126	Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts	(T)
K131	Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide	(C, T)
K132	Spent absorbent and wastewater separator solids from the production of methyl bromide	(T)
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)
K047	Pink/red water from TNT operations	(R)
Petroleum refining		
K048	Dissolved air flotation (DAF) float from the petroleum refining industry	(T)
K049	Slop oil emulsion solids from the petroleum refining industry	(T)
K050	Heat exchanger bundle cleaning sludge from the petroleum refining industry	(T)
K051	API separator sludge from the petroleum refining industry	(T)
K052	Tank bottoms (leaded) from the petroleum refining industry	(T)
K169	Crude oil storage tank sediment from petroleum refining operations	(T)

K170	Clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations	(T)
K171	Spent hydrotreating catalyst from petroleum refining operations, including guard beds used to desulfurize feeds to other catalytic reactors (this listing does not include inert support media)	(I,T)
K172	Spent hydrorefining catalyst from petroleum refining operations, including guard beds used to desulfurize feeds to other catalytic reactors (this listing does not include inert support media)	(I,T)
Iron and steel		
K061	Emission control dust/sludge from the primary production of steel in electric furnaces	(T)
K062	Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332)	(C,T)
Primary aluminum		
K088	Spent potliners from primary aluminum reduction	(T)
Secondary lead		
K069	Emission control dust/sludge from secondary lead smelting. (Note: This listing is stayed administratively for sludge generated from secondary acid scrubber systems. The stay will remain in effect until further administrative action is taken. If EPA takes further action effecting this stay, EPA will publish a notice of the action in the Federal Register)	(T)
K100	Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting	(T)
Veterinary pharmaceuticals		
K084	Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds	(T)
K101	Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds	(T)
K102	Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds	(T)
Ink formulation		
K086	Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead	(T)
Coking		
K060	Ammonia still lime sludge from coking operations	(T)
K087	Decanter tank tar sludge from coking operations	(T)
K141	Process residues from the recovery of coal tar, including, but not limited to, collecting sump residues from the production of coke from coal or the recovery of coke byproducts produced from coal. This listing does not include K087 (decanter tank tar sludges from coking operations)	(T)
K142	Tar storage tank residues from the production of coke from coal or from the recovery of coke byproducts produced from coal	(T)
K143	Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke byproducts produced from coal	(T)
K144	Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke byproducts produced from coal	(T)
K145	Residues from naphthalene collection and recovery operations from the recovery of coke byproducts produced from coal	(T)
K147	Tar storage tank residues from coal tar refining	(T)
K148	Residues from coal tar distillation, including but not limited to, still bottoms	(T)

Table 6: Acutely Hazardous Discarded Commercial Chemical Products (P Listed) (40 CFR 261.33)		
Hazardous waste #	**CAS #**	**Substance**
P023	107–20–0	Acetaldehyde, chloro-
P002	591–08–2	Acetamide, N-(aminothioxomethyl)-
P057	640–19–7	Acetamide, 2-fluoro-
P058	62–74–8	Acetic acid, fluoro-, sodium salt
P002	591–08–2	1-Acetyl-2-thiourea
P003	107–02–8	Acrolein
P070	116–06–3	Aldicarb
P203	1646–88–4	Aldicarb sulfone
P004	309–00–2	Aldrin
P005	107–18–6	Allyl alcohol
P006	20859–73–8	Aluminum phosphide (R,T)
P007	2763–96–4	5-(Aminomethyl)-3-isoxazolol
P008	504–24–5	4-Aminopyridine
P009	131–74–8	Ammonium picrate (R)
P119	7803–55–6	Ammonium vanadate
P099	506–61–6	Argentate(1-), bis(cyano-C)-, potassium
P010	7778–39–4	Arsenic acid H3AsO4
P012	1327–53–3	Arsenic oxide As2O3
P011	1303–28–2	Arsenic oxide As2O5
P011	1303–28–2	Arsenic pentoxide
P012	1327–53–3	Arsenic trioxide
P038	692–42–2	Arsine, diethyl-
P036	696–28–6	Arsonous dichloride, phenyl-
P054	151–56–4	Aziridine
P067	75–55–8	Aziridine, 2-methyl-
P013	542–62–1	Barium cyanide
P024	106–47–8	Benzenamine, 4-chloro-
P077	100–01–6	Benzenamine, 4-nitro-
P028	100–44–7	Benzene, (chloromethyl)-
P042	51–43–4	1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-, (R)-
P046	122–09–8	Benzeneethanamine, alpha,alpha-dimethyl-
P014	108–98–5	Benzenethiol
P127	1563–66–2	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate
P188	57–64–7	Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1)
P001	181–81–2	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations greater than 0.3%
P028	100–44–7	Benzyl chloride
P015	7440–41–7	Beryllium powder
P017	598–31–2	Bromoacetone
P018	357–57–3	Brucine
P045	39196–18–4	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O-[(methylamino)carbonyl] oxime
P021	592–01–8	Calcium cyanide
P021	592–01–8	Calcium cyanide Ca(CN)2
P189	55285–14–8	Carbamic acid, [(dibutylamino)- thio]methyl-, 2,3-dihydro-2,2-dimethyl- 7-benzofuranyl ester
P191	644–64–4	Carbamic acid, dimethyl-, 1-[(dimethyl-amino)carbonyl]- 5-methyl-1H- pyrazol-3-yl ester
P192	119–38–0	Carbamic acid, dimethyl-, 3-methyl-1- (1-methylethyl)-1H- pyrazol-5-yl ester
P190	1129–41–5	Carbamic acid, methyl-, 3-methylphenyl ester
P127	1563–66–2	Carbofuran
P022	75–15–0	Carbon disulfide
P095	75–44–5	Carbonic dichloride
P189	55285–14–8	Carbosulfan
P023	107–20–0	Chloroacetaldehyde

P024	106–47–8	p-Chloroaniline
P026	5344–82–1	1-(o-Chlorophenyl)thiourea
P027	542–76–7	3-Chloropropionitrile
P029	544–92–3	Copper cyanide
P029	544–92–3	Copper cyanide Cu(CN)
P202	64–00–6	m-Cumenyl methylcarbamate
P030		Cyanides (soluble cyanide salts), not otherwise specified
P031	460–19–5	Cyanogen
P033	506–77–4	Cyanogen chloride
P033	506–77–4	Cyanogen chloride (CN)Cl
P034	131–89–5	2-Cyclohexyl-4,6-dinitrophenol
P016	542–88–1	Dichloromethyl ether
P036	696–28–6	Dichlorophenylarsine
P037	60–57–1	Dieldrin
P038	692–42–2	Diethylarsine
P041	311–45–5	Diethyl-p-nitrophenyl phosphate
P040	297–97–2	O,O-Diethyl O-pyrazinyl phosphorothioate
P043	55–91–4	Diisopropylfluorophosphate (DFP)
P004	309–00–2	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa- chloro-1,4,4a,5,8,8a,-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha,8abeta)-
P060	465–73–6	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa- chloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5beta,8beta,8abeta)-
P037	60–57–1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta, 7aalpha)-
P051	172–20–8	2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2abeta,3alpha,6alpha,6abeta,7beta, 7aalpha)-, & metabolites
P044	60–51–5	Dimethoate
P046	122–09–8	alpha,alpha-Dimethylphenethylamine
P191	644–64–4	Dimetilan
P047	1534–52–1	4,6-Dinitro-o-cresol, & salts
P048	51–28–5	2,4-Dinitrophenol
P020	88–85–7	Dinoseb
P085	152–16–9	Diphosphoramide, octamethyl-
P111	107–49–3	Diphosphoric acid, tetraethyl ester
P039	298–04–4	Disulfoton
P049	541–53–7	Dithiobiuret
P185	26419–73–8	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O- [(methylamino)- carbonyl]oxime
P050	115–29–7	Endosulfan
P088	145–73–3	Endothall
P051	72–20–8	Endrin
P051	72–20–8	Endrin, & metabolites
P042	51–43–4	Epinephrine
P031	460–19–5	Ethanedinitrile
P194	23135–22–0	Ethanimidothioic acid, 2-(dimethylamino)-N-[[(methylamino) carbonyl]oxy]-2-oxo-, methyl ester
P066	16752–77–5	Ethanimidothioic acid, N-[[(methylamino)carbonyl]oxy]-, methyl ester
P101	107–12–0	Ethyl cyanide
P054	151–56–4	Ethyleneimine
P097	52–85–7	Famphur
P056	7782–41–4	Fluorine
P057	640–19–7	Fluoroacetamide
P058	62–74–8	Fluoroacetic acid, sodium salt
P198	23422–53–9	Formetanate hydrochloride
P197	17702–57–7	Formparanate
P065	628–86–4	Fulminic acid, mercury(2+) salt (R,T)
P059	76–44–8	Heptachlor
P062	757–58–4	Hexaethyl tetraphosphate
P116	79–19–6	Hydrazinecarbothioamide

P068	60–34–4	Hydrazine, methyl-
P063	74–90–8	Hydrocyanic acid
P063	74–90–8	Hydrogen cyanide
P096	7803–51–2	Hydrogen phosphide
P060	465–73–6	Isodrin
P192	119–38–0	Isolan
P202	64–00–6	3-Isopropylphenyl N-methylcarbamate
P007	2763–96–4	3(2H)-Isoxazolone, 5-(aminomethyl)-
P196	15339–36–3	Manganese, bis(dimethylcarbamodithioato-S,S′)-,
P196	15339–36–3	Manganese dimethyldithiocarbamate
P092	62–38–4	Mercury, (acetato-O)phenyl-
P065	628–86–4	Mercury fulminate (R,T)
P082	62–75–9	Methanamine, N-methyl-N-nitroso-
P064	624–83–9	Methane, isocyanato-
P016	542–88–1	Methane, oxybis[chloro-
P112	509–14–8	Methane, tetranitro- (R)
P118	75–70–7	Methanethiol, trichloro-
P198	23422–53–9	Methanimidamide, N,N-dimethyl-N′-[3-[[(methylamino)-carbonyl]oxy]phenyl]-, monohydrochloride
P197	17702–57–7	Methanimidamide, N,N-dimethyl-N′-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-
P050	115–29–7	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide
P059	76–44–8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-
P199	2032–65–7	Methiocarb
P066	16752–77–5	Methomyl
P068	60–34–4	Methyl hydrazine
P064	624–83–9	Methyl isocyanate
P069	75–86–5	2-Methyllactonitrile
P071	298–00–0	Methyl parathion
P190	1129–41–5	Metolcarb
P128	315–8–4	Mexacarbate
P072	86–88–4	alpha-Naphthylthiourea
P073	13463–39–3	Nickel carbonyl
P073	13463–39–3	Nickel carbonyl Ni(CO)4, (T-4)-
P074	557–19–7	Nickel cyanide
P074	557–19–7	Nickel cyanide Ni(CN)2
P075	154–11–5	Nicotine, & salts
P076	10102–43–9	Nitric oxide
P077	100–01–6	p-Nitroaniline
P078	10102–44–0	Nitrogen dioxide
P076	10102–43–9	Nitrogen oxide NO
P078	10102–44–0	Nitrogen oxide NO2
P081	55–63–0	Nitroglycerine (R)
P082	62–75–9	N-Nitrosodimethylamine
P084	4549–40–0	N-Nitrosomethylvinylamine
P085	152–16–9	Octamethylpyrophosphoramide
P087	20816–12–0	Osmium oxide OsO4, (T-4)-
P087	20816–12–0	Osmium tetroxide
P088	145–73–3	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
P194	23135–22–0	Oxamyl
P089	56–38–2	Parathion
P034	131–89–5	Phenol, 2-cyclohexyl-4,6-dinitro-
P048	51–28–5	Phenol, 2,4-dinitro-
P047	1534–52–1	Phenol, 2-methyl-4,6-dinitro-, & salts
P020	88–85–7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-
P009	131–74–8	Phenol, 2,4,6-trinitro-, ammonium salt (R)
P128	315–18–4	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester)
P199	2032–65–7	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate
P202	64–00–6	Phenol, 3-(1-methylethyl)-, methyl carbamate

P201	2631–37–0	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate
P092	62–38–4	Phenylmercury acetate
P093	103–85–5	Phenylthiourea
P094	298–02–2	Phorate
P095	75–44–5	Phosgene
P096	7803–51–2	Phosphine
P041	311–45–5	Phosphoric acid, diethyl 4-nitrophenyl ester
P039	298–04–4	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester
P094	298–02–2	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester
P044	60–51–5	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester
P043	55–91–4	Phosphorofluoridic acid, bis(1-methylethyl) ester
P089	56–38–2	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester
P040	297–97–2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester
P097	52–85–7	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl]phenyl] O,O-dimethyl ester
P071	298–00–0	Phosphorothioic acid, O,O,-dimethyl O-(4-nitrophenyl) ester
P204	57–47–6	Physostigmine
P188	57–64–7	Physostigmine salicylate
P110	78–00–2	Plumbane, tetraethyl-
P098	151–50–8	Potassium cyanide
P098	151–50–8	Potassium cyanide K(CN)
P099	506–61–6	Potassium silver cyanide
P201	2631–37–0	Promecarb
P070	116–06–3	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime
P203	1646–88–4	Propanal, 2-methyl-2-(methyl-sulfonyl)-, O-[(methylamino)carbonyl] oxime
P101	107–12–0	Propanenitrile
P027	542–76–7	Propanenitrile, 3-chloro-
P069	75–86–5	Propanenitrile, 2-hydroxy-2-methyl-
P081	55–63–0	1,2,3-Propanetriol, trinitrate (R)
P017	598–31–2	2-Propanone, 1-bromo-
P102	107–19–7	Propargyl alcohol
P003	107–02–8	2-Propenal
P005	107–18–6	2-Propen-1-ol
P067	75–55–8	1,2-Propylenimine
P102	107–19–7	2-Propyn-1-ol
P008	504–24–5	4-Pyridinamine
P075	154–11–5	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts
P204	57–47–6	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-
P114	12039–52–0	Selenious acid, dithallium(1+) salt
P103	630–10–4	Selenourea
P104	506–64–9	Silver cyanide
P104	506–64–9	Silver cyanide Ag(CN)
P105	26628–22–8	Sodium azide
P106	143–33–9	Sodium cyanide
P106	143–33–9	Sodium cyanide Na(CN)
P108	157–24–9	Strychnidin-10-one, & salts
P018	357–57–3	Strychnidin-10-one, 2,3-dimethoxy-
P108	157–24–9	Strychnine, & salts
P115	7446–18–6	Sulfuric acid, dithallium(1+) salt
P109	3689–24–5	Tetraethyldithiopyrophosphate
P110	78–00–2	Tetraethyl lead
P111	107–49–3	Tetraethyl pyrophosphate
P112	509–14–8	Tetranitromethane (R)
P062	757–58–4	Tetraphosphoric acid, hexaethyl ester
P113	1314–32–5	Thallic oxide
P113	1314–32–5	Thallium oxide Tl2O3

P114	12039–52–0	Thallium(I) selenite
P115	7446–18–6	Thallium(I) sulfate
P109	3689–24–5	Thiodiphosphoric acid, tetraethyl ester
P045	39196–18–4	Thiofanox
P049	541–53–7	Thioimidodicarbonic diamide [(H2N)C(S)]2NH
P014	108–98–5	Thiophenol
P116	79–19–6	Thiosemicarbazide
P026	5344–82–1	Thiourea, (2-chlorophenyl)-
P072	86–88–4	Thiourea, 1-naphthalenyl-
P093	103–85–5	Thiourea, phenyl-
P185	26419–73–8	Tirpate
P123	8001–35–2	Toxaphene
P118	75–70–7	Trichloromethanethiol
P119	7803–55–6	Vanadic acid, ammonium salt
P120	1314–62–1	Vanadium oxide V2O5
P120	1314–62–1	Vanadium pentoxide
P084	4549–40–0	Vinylamine, N-methyl-N-nitroso-
P001	181–81–2	Warfarin, & salts, when present at concentrations greater than 0.3%
P205	137–30–4	Zinc, bis(dimethylcarbamodithioato-S,S')-,
P121	557–21–1	Zinc cyanide
P121	557–21–1	Zinc cyanide Zn(CN)2
P122	1314–84–7	Zinc phosphide Zn3P2, when present at concentrations greater than 10% (R,T)
P205	137–30–4	Ziram
Key: T = toxicity; R = reactivity; I = ignitability; C = corrosivity. Absence of a letter indicates that the compound is listed only for toxicity.		

Table 7: Discarded Commercial Chemical Products (U Listed) (40 CFR 261.33)

Hazardous waste #	CAS #	Substance
U394	30558–43–1	A2213
U001	75–07–0	Acetaldehyde (I)
U034	75–87–6	Acetaldehyde, trichloro-
U187	62–44–2	Acetamide, N-(4-ethoxyphenyl)-
U005	53–96–3	Acetamide, N-9H-fluoren-2-yl-
U240	[1]94–75–7	Acetic acid, (2,4-dichlorophenoxy)-, salts & esters
U112	141–78–6	Acetic acid ethyl ester (I)
U144	301–04–2	Acetic acid, lead(2+) salt
U214	563–68–8	Acetic acid, thallium(1+) salt
see F027	93–76–5	Acetic acid, (2,4,5-trichlorophenoxy)-
U002	67–64–1	Acetone (I)
U003	75–05–8	Acetonitrile (I,T)
U004	98–86–2	Acetophenone
U005	53–96–3	2-Acetylaminofluorene
U006	75–36–5	Acetyl chloride (C,R,T)
U007	79–06–1	Acrylamide
U008	79–10–7	Acrylic acid (I)
U009	107–13–1	Acrylonitrile
U011	61–82–5	Amitrole
U012	62–53–3	Aniline (I,T)
U136	75–60–5	Arsinic acid, dimethyl-
U014	492–80–8	Auramine
U015	115–02–6	Azaserie
U010	50–07–7	Azirino[2',3':3,4]pyrrolo[1,2-a]indole-4,7-dione, 6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta,8aalpha,8balpha)]-
U280	101–27–9	Barban
U278	22781–23–3	Bendiocarb
U364	22961–82–6	Bendiocarb phenol

U271	17804–35–2	Benomyl
U157	56–49–5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-
U016	225–51–4	Benz[c]acridine
U017	98–87–3	Benzal chloride
U192	23950–58–5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-
U018	56–55–3	Benz[a]anthracene
U094	57–97–6	Benz[a]anthracene, 7,12-dimethyl-
U012	62–53–3	Benzenamine (I,T)
U014	492–80–8	Benzenamine, 4,4′-carbonimidoylbis[N,N-dimethyl-
U049	3165–93–3	Benzenamine, 4-chloro-2-methyl-, hydrochloride
U093	60–11–7	Benzenamine, N,N-dimethyl-4-(phenylazo)-
U328	95–53–4	Benzenamine, 2-methyl-
U353	106–49–0	Benzenamine, 4-methyl-
U158	101–14–4	Benzenamine, 4,4′-methylenebis[2-chloro-
U222	636–21–5	Benzenamine, 2-methyl-, hydrochloride
U181	99–55–8	Benzenamine, 2-methyl-5-nitro-
U019	71–43–2	Benzene (I,T)
U038	510–15–6	Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester
U030	101–55–3	Benzene, 1-bromo-4-phenoxy-
U035	305–03–3	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-
U037	108–90–7	Benzene, chloro-
U221	25376–45–8	Benzenediamine, ar-methyl-
U028	117–81–7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
U069	84–74–2	1,2-Benzenedicarboxylic acid, dibutyl ester
U088	84–66–2	1,2-Benzenedicarboxylic acid, diethyl ester
U102	131–11–3	1,2-Benzenedicarboxylic acid, dimethyl ester
U107	117–84–0	1,2-Benzenedicarboxylic acid, dioctyl ester
U070	95–50–1	Benzene, 1,2-dichloro-
U071	541–73–1	Benzene, 1,3-dichloro-
U072	106–46–7	Benzene, 1,4-dichloro-
U060	72–54–8	Benzene, 1,1′-(2,2-dichloroethylidene)bis[4-chloro-
U017	98–87–3	Benzene, (dichloromethyl)-
U223	26471–62–5	Benzene, 1,3-diisocyanatomethyl- (R,T)
U239	1330–20–7	Benzene, dimethyl- (I)
U201	108–46–3	1,3-Benzenediol
U127	118–74–1	Benzene, hexachloro-
U056	110–82–7	Benzene, hexahydro- (I)
U220	108–88–3	Benzene, methyl-
U105	121–14–2	Benzene, 1-methyl-2,4-dinitro-
U106	606–20–2	Benzene, 2-methyl-1,3-dinitro-
U055	98–82–8	Benzene, (1-methylethyl)- (I)
U169	98–95–3	Benzene, nitro-
U183	608–93–5	Benzene, pentachloro-
U185	82–68–8	Benzene, pentachloronitro-
U020	98–09–9	Benzenesulfonic acid chloride (C,R)
U020	98–09–9	Benzenesulfonyl chloride (C,R)
U207	95–94–3	Benzene, 1,2,4,5-tetrachloro-
U061	50–29–3	Benzene, 1,1′-(2,2,2-trichloroethylidene)bis[4-chloro-
U247	72–43–5	Benzene, 1,1′-(2,2,2-trichloroethylidene)bis[4- methoxy-
U023	98–07–7	Benzene, (trichloromethyl)-
U234	99–35–4	Benzene, 1,3,5-trinitro-
U021	92–87–5	Benzidine
U278	22781–23–3	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate
U364	22961–82–6	1,3-Benzodioxol-4-ol, 2,2-dimethyl-,
U203	94–59–7	1,3-Benzodioxole, 5-(2-propenyl)-
U141	120–58–1	1,3-Benzodioxole, 5-(1-propenyl)-
U367	1563–38–8	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-
U090	94–58–6	1,3-Benzodioxole, 5-propyl-
U064	189–55–9	Benzo[rst]pentaphene
U248	[1]81–81–2	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present

		at concentrations of 0.3% or less
U022	50–32–8	Benzo[a]pyrene
U197	106–51–4	p-Benzoquinone
U023	98–07–7	Benzotrichloride (C,R,T)
U085	1464–53–5	2,2′-Bioxirane
U021	92–87–5	[1,1′-Biphenyl]-4,4′-diamine
U073	91–94–1	[1,1′-Biphenyl]-4,4′-diamine, 3,3′-dichloro-
U091	119–90–4	[1,1′-Biphenyl]-4,4′-diamine, 3,3′-dimethoxy-
U095	119–93–7	[1,1′-Biphenyl]-4,4′-diamine, 3,3′-dimethyl-
U225	75–25–2	Bromoform
U030	101–55–3	4-Bromophenyl phenyl ether
U128	87–68–3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-
U172	924–16–3	1-Butanamine, N-butyl-N-nitroso-
U031	71–36–3	1-Butanol (I)
U159	78–93–3	2-Butanone (I,T)
U160	1338–23–4	2-Butanone, peroxide (R,T)
U053	4170–30–3	2-Butenal
U074	764–41–0	2-Butene, 1,4-dichloro- (I,T)
U143	303–34–4	2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester,[1S-[1alpha(Z),7(2S*,3R*),7aalpha]]-
U031	71–36–3	n-Butyl alcohol (I)
U136	75–60–5	Cacodylic acid
U032	13765–19–0	Calcium chromate
U372	10605–21–7	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester
U271	17804–35–2	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-, methyl ester
U280	101–27–9	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester
U238	51–79–6	Carbamic acid, ethyl ester
U178	615–53–2	Carbamic acid, methylnitroso-, ethyl ester
U373	122–42–9	Carbamic acid, phenyl-, 1-methylethyl ester
U409	23564–05–8	Carbamic acid, [1,2-phenylenebis (iminocarbonothioyl)]bis-, dimethyl ester
U097	79–44–7	Carbamic chloride, dimethyl-
U389	2303–17–5	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester
U387	52888–80–9	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester
U114	[1]111–54–6	Carbamodithioic acid, 1,2-ethanediylbis-, salts & esters
U062	2303–16–4	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester
U279	63–25–2	Carbaryl
U372	10605–21–7	Carbendazim
U367	1563–38–8	Carbofuran phenol
U215	6533–73–9	Carbonic acid, dithallium(1+) salt
U033	353–50–4	Carbonic difluoride
U156	79–22–1	Carbonochloridic acid, methyl ester (I,T)
U033	353–50–4	Carbon oxyfluoride (R,T)
U211	56–23–5	Carbon tetrachloride
U034	75–87–6	Chloral
U035	305–03–3	Chlorambucil
U036	57–74–9	Chlordane, alpha & gamma isomers
U026	494–03–1	Chlornaphazin
U037	108–90–7	Chlorobenzene
U038	510–15–6	Chlorobenzilate
U039	59–50–7	p-Chloro-m-cresol
U042	110–75–8	2-Chloroethyl vinyl ether
U044	67–66–3	Chloroform
U046	107–30–2	Chloromethyl methyl ether
U047	91–58–7	beta-Chloronaphthalene
U048	95–57–8	o-Chlorophenol
U049	3165–93–3	4-Chloro-o-toluidine, hydrochloride
U032	13765–19–0	Chromic acid H_2CrO_4, calcium salt
U050	218–01–9	Chrysene

U051		Creosote
U052	1319–77–3	Cresol (Cresylic acid)
U053	4170–30–3	Crotonaldehyde
U055	98–82–8	Cumene (I)
U246	506–68–3	Cyanogen bromide (CN)Br
U197	106–51–4	2,5-Cyclohexadiene-1,4-dione
U056	110–82–7	Cyclohexane (I)
U129	58–89–9	Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1alpha,2alpha,3beta,4alpha,5alpha,6beta)-
U057	108–94–1	Cyclohexanone (I)
U130	77–47–4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-
U058	50–18–0	Cyclophosphamide
U240	[1]94–75–7	2,4-D, salts & esters
U059	20830–81–3	Daunomycin
U060	72–54–8	DDD
U061	50–29–3	DDT
U062	2303–16–4	Diallate
U063	53–70–3	Dibenz[a,h]anthracene
U064	189–55–9	Dibenzo[a,i]pyrene
U066	96–12–8	1,2-Dibromo-3-chloropropane
U069	84–74–2	Dibutyl phthalate
U070	95–50–1	o-Dichlorobenzene
U071	541–73–1	m-Dichlorobenzene
U072	106–46–7	p-Dichlorobenzene
U073	91–94–1	3,3′-Dichlorobenzidine
U074	764–41–0	1,4-Dichloro-2-butene (I,T)
U075	75–71–8	Dichlorodifluoromethane
U078	75–35–4	1,1-Dichloroethylene
U079	156–60–5	1,2-Dichloroethylene
U025	111–44–4	Dichloroethyl ether
U027	108–60–1	Dichloroisopropyl ether
U024	111–91–1	Dichloromethoxy ethane
U081	120–83–2	2,4-Dichlorophenol
U082	87–65–0	2,6-Dichlorophenol
U084	542–75–6	1,3-Dichloropropene
U085	1464–53–5	1,2:3,4-Diepoxybutane (I,T)
U108	123–91–1	1,4-Diethyleneoxide
U028	117–81–7	Diethylhexyl phthalate
U395	5952–26–1	Diethylene glycol, dicarbamate
U086	1615–80–1	N,N′-Diethylhydrazine
U087	3288–58–2	O,O-Diethyl S-methyl dithiophosphate
U088	84–66–2	Diethyl phthalate
U089	56–53–1	Diethylstilbesterol
U090	94–58–6	Dihydrosafrole
U091	119–90–4	3,3′-Dimethoxybenzidine
U092	124–40–3	Dimethylamine (I)
U093	60–11–7	p-Dimethylaminoazobenzene
U094	57–97–6	7,12-Dimethylbenz[a]anthracene
U095	119–93–7	3,3′-Dimethylbenzidine
U096	80–15–9	alpha,alpha-Dimethylbenzylhydroperoxide (R)
U097	79–44–7	Dimethylcarbamoyl chloride
U098	57–14–7	1,1-Dimethylhydrazine
U099	540–73–8	1,2-Dimethylhydrazine
U101	105–67–9	2,4-Dimethylphenol
U102	131–11–3	Dimethyl phthalate
U103	77–78–1	Dimethyl sulfate
U105	121–14–2	2,4-Dinitrotoluene
U106	606–20–2	2,6-Dinitrotoluene
U107	117–84–0	Di-n-octyl phthalate
U108	123–91–1	1,4-Dioxane
U109	122–66–7	1,2-Diphenylhydrazine

U110	142–84–7	Dipropylamine (I)
U111	621–64–7	Di-n-propylnitrosamine
U041	106–89–8	Epichlorohydrin
U001	75–07–0	Ethanal (I)
U404	121–44–8	Ethanamine, N,N-diethyl-
U174	55–18–5	Ethanamine, N-ethyl-N-nitroso-
U155	91–80–5	1,2-Ethanediamine, N,N-dimethyl-N′-2-pyridinyl-N′-(2-thienylmethyl)-
U067	106–93–4	Ethane, 1,2-dibromo-
U076	75–34–3	Ethane, 1,1-dichloro-
U077	107–06–2	Ethane, 1,2-dichloro-
U131	67–72–1	Ethane, hexachloro-
U024	111–91–1	Ethane, 1,1′-[methylenebis(oxy)]bis[2-chloro-
U117	60–29–7	Ethane, 1,1′-oxybis-(I)
U025	111–44–4	Ethane, 1,1′-oxybis[2-chloro-
U184	76–01–7	Ethane, pentachloro-
U208	630–20–6	Ethane, 1,1,1,2-tetrachloro-
U209	79–34–5	Ethane, 1,1,2,2-tetrachloro-
U218	62–55–5	Ethanethioamide
U226	71–55–6	Ethane, 1,1,1-trichloro-
U227	79–00–5	Ethane, 1,1,2-trichloro-
U410	59669–26–0	Ethanimidothioic acid, N,N′- [thiobis[(methylimino)carbonyloxy]]bis-, dimethyl ester
U394	30558–43–1	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester
U359	110–80–5	Ethanol, 2-ethoxy-
U173	1116–54–7	Ethanol, 2,2′-(nitrosoimino)bis-
U395	5952–26–1	Ethanol, 2,2′-oxybis-, dicarbamate
U004	98–86–2	Ethanone, 1-phenyl-
U043	75–01–4	Ethene, chloro-
U042	110–75–8	Ethene, (2-chloroethoxy)-
U078	75–35–4	Ethene, 1,1-dichloro-
U079	156–60–5	Ethene, 1,2-dichloro-, (E)-
U210	127–18–4	Ethene, tetrachloro-
U228	79–01–6	Ethene, trichloro-
U112	141–78–6	Ethyl acetate (I)
U113	140–88–5	Ethyl acrylate (I)
U238	51–79–6	Ethyl carbamate (urethane)
U117	60–29–7	Ethyl ether (I)
U114	[1]111–54–6	Ethylenebisdithiocarbamic acid, salts & esters
U067	106–93–4	Ethylene dibromide
U077	107–06–2	Ethylene dichloride
U359	110–80–5	Ethylene glycol monoethyl ether
U115	75–21–8	Ethylene oxide (I,T)
U116	96–45–7	Ethylenethiourea
U076	75–34–3	Ethylidene dichloride
U118	97–63–2	Ethyl methacrylate
U119	62–50–0	Ethyl methanesulfonate
U120	206–44–0	Fluoranthene
U122	50–00–0	Formaldehyde
U123	64–18–6	Formic acid (C,T)
U124	110–00–9	Furan (I)
U125	98–01–1	2-Furancarboxaldehyde (I)
U147	108–31–6	2,5-Furandione
U213	109–99–9	Furan, tetrahydro-(I)
U125	98–01–1	Furfural (I)
U124	110–00–9	Furfuran (I)
U206	18883–66–4	Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-, D-
U206	18883–66–4	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-
U126	765–34–4	Glycidylaldehyde
U163	70–25–7	Guanidine, N-methyl-N′-nitro-N-nitroso-
U127	118–74–1	Hexachlorobenzene

U128	87–68–3	Hexachlorobutadiene
U130	77–47–4	Hexachlorocyclopentadiene
U131	67–72–1	Hexachloroethane
U132	70–30–4	Hexachlorophene
U243	1888–71–7	Hexachloropropene
U133	302–01–2	Hydrazine (R,T)
U086	1615–80–1	Hydrazine, 1,2-diethyl-
U098	57–14–7	Hydrazine, 1,1-dimethyl-
U099	540–73–8	Hydrazine, 1,2-dimethyl-
U109	122–66–7	Hydrazine, 1,2-diphenyl-
U134	7664–39–3	Hydrofluoric acid (C,T)
U134	7664–39–3	Hydrogen fluoride (C,T)
U135	7783–06–4	Hydrogen sulfide
U135	7783–06–4	Hydrogen sulfide H_2S
U096	80–15–9	Hydroperoxide, 1-methyl-1-phenylethyl- (R)
U116	96–45–7	2-Imidazolidinethione
U137	193–39–5	Indeno[1,2,3-cd]pyrene
U190	85–44–9	1,3-Isobenzofurandione
U140	78–83–1	Isobutyl alcohol (I,T)
U141	120–58–1	Isosafrole
U142	143–50–0	Kepone
U143	303–34–4	Lasiocarpine
U144	301–04–2	Lead acetate
U146	1335–32–6	Lead, bis(acetato-O)tetrahydroxytri-
U145	7446–27–7	Lead phosphate
U146	1335–32–6	Lead subacetate
U129	58–89–9	Lindane
U163	70–25–7	MNNG
U147	108–31–6	Maleic anhydride
U148	123–33–1	Maleic hydrazide
U149	109–77–3	Malononitrile
U150	148–82–3	Melphalan
U151	7439–97–6	Mercury
U152	126–98–7	Methacrylonitrile (I, T)
U092	124–40–3	Methanamine, N-methyl- (I)
U029	74–83–9	Methane, bromo-
U045	74–87–3	Methane, chloro- (I, T)
U046	107–30–2	Methane, chloromethoxy-
U068	74–95–3	Methane, dibromo-
U080	75–09–2	Methane, dichloro-
U075	75–71–8	Methane, dichlorodifluoro-
U138	74–88–4	Methane, iodo-
U119	62–50–0	Methanesulfonic acid, ethyl ester
U211	56–23–5	Methane, tetrachloro-
U153	74–93–1	Methanethiol (I, T)
U225	75–25–2	Methane, tribromo-
U044	67–66–3	Methane, trichloro-
U121	75–69–4	Methane, trichlorofluoro-
U036	57–74–9	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-
U154	67–56–1	Methanol (I)
U155	91–80–5	Methapyrilene
U142	143–50–0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-
U247	72–43–5	Methoxychlor
U154	67–56–1	Methyl alcohol (I)
U029	74–83–9	Methyl bromide
U186	504–60–9	1-Methylbutadiene (I)
U045	74–87–3	Methyl chloride (I,T)
U156	79–22–1	Methyl chlorocarbonate (I,T)
U226	71–55–6	Methyl chloroform

U157	56–49–5	3-Methylcholanthrene
U158	101–14–4	4,4′-Methylenebis(2-chloroaniline)
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)
U138	74–88–4	Methyl iodide
U161	108–10–1	Methyl isobutyl ketone (I)
U162	80–62–6	Methyl methacrylate (I,T)
U161	108–10–1	4-Methyl-2-pentanone (I)
U164	56–04–2	Methylthiouracil
U010	50–07–7	Mitomycin C
U059	20830–81–3	5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy)-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-
U167	134–32–7	1-Naphthalenamine
U168	91–59–8	2-Naphthalenamine
U026	494–03–1	Naphthalenamine, N,N′-bis(2-chloroethyl)-
U165	91–20–3	Naphthalene
U047	91–58–7	Naphthalene, 2-chloro-
U166	130–15–4	1,4-Naphthalenedione
U236	72–57–1	2,7-Naphthalenedisulfonic acid, 3,3′-[(3,3′-dimethyl[1,1′-biphenyl]-4,4′-diyl)bis(azo)bis[5-amino-4-hydroxy]-, tetrasodium salt
U279	63–25–2	1-Naphthalenol, methylcarbamate
U166	130–15–4	1,4-Naphthoquinone
U167	134–32–7	alpha-Naphthylamine
U168	91–59–8	beta-Naphthylamine
U217	10102–45–1	Nitric acid, thallium(1+) salt
U169	98–95–3	Nitrobenzene (I,T)
U170	100–02–7	p-Nitrophenol
U171	79–46–9	2-Nitropropane (I,T)
U172	924–16–3	N-Nitrosodi-n-butylamine
U173	1116–54–7	N-Nitrosodiethanolamine
U174	55–18–5	N-Nitrosodiethylamine
U176	759–73–9	N-Nitroso-N-ethylurea
U177	684–93–5	N-Nitroso-N-methylurea
U178	615–53–2	N-Nitroso-N-methylurethane
U179	100–75–4	N-Nitrosopiperidine
U180	930–55–2	N-Nitrosopyrrolidine
U181	99–55–8	5-Nitro-o-toluidine
U193	1120–71–4	1,2-Oxathiolane, 2,2-dioxide
U058	50–18–0	2H-1,3,2-Oxazaphosphorin-2-amine,N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide
U115	75–21–8	Oxirane (I,T)
U126	765–34–4	Oxiranecarboxyaldehyde
U041	106–89–8	Oxirane, (chloromethyl)-
U182	123-63-7	Paraldehyde
U183	608–93–5	Pentachlorobenzene
U184	76–01–7	Pentachloroethane
U185	82–68–8	Pentachloronitrobenzene (PCNB)
See F027	87–86–5	Pentachlorophenol
U161	108–10–1	Pentanol, 4-methyl-
U186	504–60–9	1,3-Pentadiene (I)
U187	62–44–2	Phenacetin
U188	108–95–2	Phenol
U048	95–57–8	Phenol, 2-chloro-
U039	59–50–7	Phenol, 4-chloro-3-methyl-
U081	120–83–2	Phenol, 2,4-dichloro-
U082	87–65–0	Phenol, 2,6-dichloro-
U089	56–53–1	Phenol, 4,4′-(1,2-diethyl-1,2-ethenediyl)bis-, (E)-
U101	105–67–9	Phenol, 2,4-dimethyl-

U052	1319–77–3	Phenol, methyl-
U132	70–30–4	Phenol, 2,2′-methylenebis[3,4,6-trichloro-
U411	114–26–1	Phenol, 2-(1-methylethoxy)-, methylcarbamate
U170	100–02–7	Phenol, 4-nitro-
See F027	87–86–5	Phenol, pentachloro-
See F027	58–90–2	Phenol, 2,3,4,6-tetrachloro-
See F027	95–95–4	Phenol, 2,4,5-trichloro-
See F027	88–06–2	Phenol, 2,4,6-trichloro-
U150	148–82–3	L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-
U145	7446–27–7	Phosphoric acid, lead(2+) salt (2:3)
U087	3288–58–2	Phosphorodithioic acid, O,O-diethyl S-methyl ester
U189	1314–80–3	Phosphorus sulfide (R)
U190	85–44–9	Phthalic anhydride
U191	109–06–8	2-Picoline
U179	100–75–4	Piperidine, 1-nitroso-
U192	23950–58–5	Pronamide
U194	107–10–8	1-Propanamine (I,T)
U111	621–64–7	1-Propanamine, N-nitroso-N-propyl-
U110	142–84–7	1-Propanamine, N-propyl- (I)
U066	96–12–8	Propane, 1,2-dibromo-3-chloro-
U083	78–87–5	Propane, 1,2-dichloro-
U149	109–77–3	Propanedinitrile
U171	79–46–9	Propane, 2-nitro- (I,T)
U027	108–60–1	Propane, 2,2′-oxybis[2-chloro-
U193	1120–71–4	1,3-Propane sultone
See F027	93–72–1	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-
U235	126–72–7	1-Propanol, 2,3-dibromo-, phosphate (3:1)
U140	78–83–1	1-Propanol, 2-methyl- (I,T)
U002	67–64–1	2-Propanone (I)
U007	79–06–1	2-Propenamide
U084	542–75–6	1-Propene, 1,3-dichloro-
U243	1888–71–7	1-Propene, 1,1,2,3,3,3-hexachloro-
U009	107–13–1	2-Propenenitrile
U152	126–98–7	2-Propenenitrile, 2-methyl- (I,T)
U008	79–10–7	2-Propenoic acid (I)
U113	140–88–5	2-Propenoic acid, ethyl ester (I)
U118	97–63–2	2-Propenoic acid, 2-methyl-, ethyl ester
U162	80–62–6	2-Propenoic acid, 2-methyl-, methyl ester (I,T)
U373	122–42–9	Propham
U411	114–26–1	Propoxur
U387	52888–80–9	Prosulfocarb
U194	107–10–8	n-Propylamine (I,T)
U083	78–87–5	Propylene dichloride
U148	123–33–1	3,6-Pyridazinedione, 1,2-dihydro-
U196	110–86–1	Pyridine
U191	109–06–8	Pyridine, 2-methyl-
U237	66–75–1	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-
U164	56–04–2	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-
U180	930–55–2	Pyrrolidine, 1-nitroso-
U200	50–55–5	Reserpine
U201	108–46–3	Resorcinol
U203	94–59–7	Safrole
U204	7783–00–8	Selenious acid
U204	7783–00–8	Selenium dioxide
U205	7488–56–4	Selenium sulfide
U205	7488–56–4	Selenium sulfide SeS_2(R,T)
U015	115–02–6	L-Serine, diazoacetate (ester)
See F027	93–72–1	Silvex (2,4,5-TP)
U206	18883–66–4	Streptozotocin
U103	77–78–1	Sulfuric acid, dimethyl ester

U189	1314–80–3	Sulfur phosphide (R)
See F027	93–76–5	2,4,5-T
U207	95–94–3	1,2,4,5-Tetrachlorobenzene
U208	630–20–6	1,1,1,2-Tetrachloroethane
U209	79–34–5	1,1,2,2-Tetrachloroethane
U210	127–18–4	Tetrachloroethylene
See F027	58–90–2	2,3,4,6-Tetrachlorophenol
U213	109–99–9	Tetrahydrofuran (I)
U214	563–68–8	Thallium(I) acetate
U215	6533–73–9	Thallium(I) carbonate
U216	7791–12–0	Thallium(I) chloride
U216	7791–12–0	thallium chloride TlCl
U217	10102–45–1	Thallium(I) nitrate
U218	62–55–5	Thioacetamide
U410	59669–26–0	Thiodicarb
U153	74–93–1	Thiomethanol (I,T)
U244	137–26–8	Thioperoxydicarbonic diamide $[(H_2N)C(S)]_2S_2$, tetramethyl-
U409	23564–05–8	Thiophanate-methyl
U219	62–56–6	Thiourea
U244	137–26–8	Thiram
U220	108–88–3	Toluene
U221	25376–45–8	Toluenediamine
U223	26471–62–5	Toluene diisocyanate (R,T)
U328	95–53–4	o-Toluidine
U353	106–49–0	p-Toluidine
U222	636–21–5	o-Toluidine hydrochloride
U389	2303–17–5	Triallate
U011	61–82–5	1H-1,2,4-Triazol-3-amine
U226	71–55–6	1,1,1-Trichloroethane
U227	79–00–5	1,1,2-Trichloroethane
U228	79–01–6	Trichloroethylene
U121	75–69–4	Trichloromonofluoromethane
See F027	95–95–4	2,4,5-Trichlorophenol
See F027	88–06–2	2,4,6-Trichlorophenol
U404	121–44–8	Triethylamine
U234	99–35–4	1,3,5-Trinitrobenzene (R,T)
U182	123–63–7	1,3,5-Trioxane, 2,4,6-trimethyl-
U235	126–72–7	Tris(2,3-dibromopropyl) phosphate
U236	72–57–1	Trypan blue
U237	66–75–1	Uracil mustard
U176	759–73–9	Urea, N-ethyl-N-nitroso-
U177	684–93–5	Urea, N-methyl-N-nitroso-
U043	75–01–4	Vinyl chloride
U248	[1]81–81–2	Warfarin, & salts, when present at concentrations of 0.3% or less
U239	1330–20–7	Xylene (I)
U200	50–55–5	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester, (3beta,16beta,17alpha,18beta,20alpha)-
U249	1314–84–7	Zinc phosphide Zn_3P_2, when present at concentrations of 10% or less

Notes:
[1]CAS Number given for parent compound only.

Universal Waste

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 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 (such as nickel-cadmium and lead-acid),
- pesticides that have been suspended and/or cancelled and recalled or that are collected as part of a waste pesticide collection program,
- mercury-containing equipment,
- discarded lamps that exhibit a hazardous characteristic, and
- aerosol cans (in New Mexico).

New Mexico Special Waste

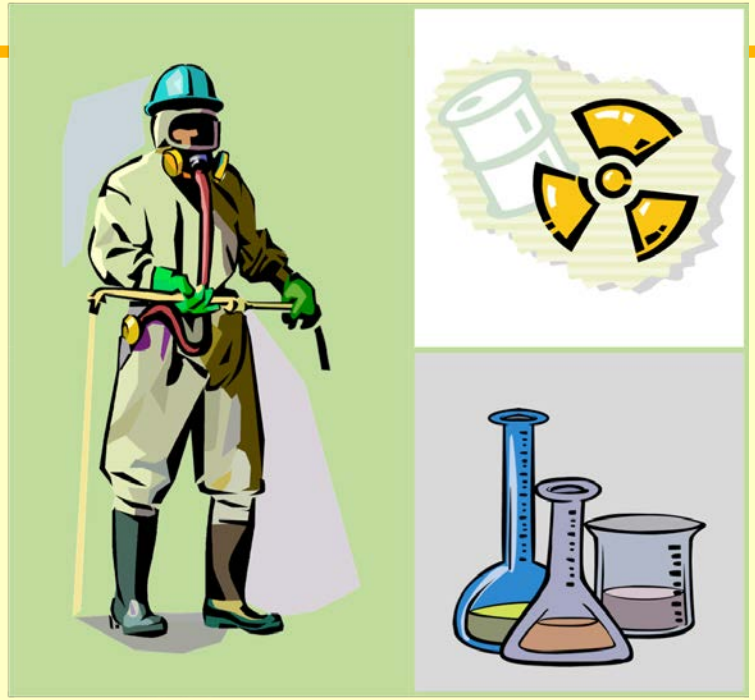
New Mexico special waste is a RCRA nonhazardous solid waste. This type of waste has unique handling, transportation, and/or disposal requirements. The nine types of special waste are

- treated formerly characteristic hazardous wastes (no longer hazardous);
- packing house and killing plant offal;
- regulated asbestos waste;
- ash;
- infectious waste;
- sludge;
- industrial solid waste that, unless specially handled or disposed, may harm the environment or endanger the public health or safety;
- the spill of a chemical substance or commercial product; and
- petroleum-contaminated soils.

Waste Generation Overview

COURSE 23263

January 2017



Course Objectives

- Recognize federal, state, and LANL environmental requirements and their impact on waste operations.
- Recognize the importance of the cradle-to-grave waste management process.
- Identify the roles and responsibilities of key LANL waste management personnel.
- Characterize a waste stream to determine whether it meets the definition of a hazardous waste.
- Identify the requirements for setting up and managing temporary waste accumulation areas.

Module 1: Framework for Compliance

Objectives

- Identify federal, state, and internal environmental regulatory requirements that guide LANL waste management practices and procedures.
- Identify the consequences of noncompliance with environmental laws and regulations.

The Kepone Disaster

Activity 1

Test Your Knowledge of LANL Waste Requirements

Discuss questions in class.
The answers to these and other questions will emerge as we complete this course.

Federal Drivers for Environmental Protection p. 14

- RCRA
- HSWA
- TSCA
- HMTA
- DOE Orders

Resource Conservation and Recovery Act

Objectives

- Protecting human health and the environment.
- Conserving energy and natural resources.
- Reducing the amount of waste generated.
- Managing waste in an environmentally sound manner.
- Cleaning up contaminated sites.

RCRA Components

Regulated Subtitles

- Subtitle C
  - Hazardous waste management.
- Subtitle D
  - Solid waste management (nonhazardous waste).
  - Note: The word “solid” can mean “nonhazardous,” as in this context. It can also mean “everything regulated by RCRA."

RCRA Hazardous Waste Regulations

Major elements of the regulations (40 CFR 260–282):

- Characterization and classification.
- Generator, transporter, and facility standards.
- Recycling standards.
- Controls on land disposal.
- Permitting requirements.
- State program requirements.
- Used oil management standards.
- UST requirements.

Hazardous and Solid Waste Amendments

- Amended RCRA in 1984.
- Introduced
  - Environmental cleanup to ensure the protection of
    - Human health and
    - The environment.
  - Restrictions on future land disposal based on
    - Concentration-based standards and
    - Technology-based standards.
  - Requirements under HSWA most applicable to LANL operations:
    - Environmental cleanup of contaminated sites and
    - Restrictions on future land disposal of many untreated hazardous wastes.

Toxic Substances Control Act (TSCA)

- Purpose
  - To characterize and understand the risks that a chemical poses ***before*** the chemical is introduced for public use.
- Requirements
  - New substances must be screened.
  - Existing substances must be tested.
  - Hazardous substances must be controlled.

Note: Polychlorinated biphenyl (PCB) compounds and asbestos are the primary TSCA-regulated substances found at LANL.

Frank R. Lautenberg Chemical Safety for the 21st Century Act

- The Toxic Substances Control Act (TSCA) was reformed in 2016:
- The reform of the TSCA gives the EPA new authorities to address the problem of toxic chemicals.
- For the first time, there are enforceable deadlines and schedules for EPA work on chemicals, as well as directed funding from fees paid by industry.
- The new Testing Authority allows the EPA to require toxicity testing through the use of an administrative order, which will speed up the chemical testing process.

Hazardous Material Transportation Act

- HMTA is implemented through DOT regulations.
- DOT regulations (49 CFR 171–178) for transportation of hazardous or mixed waste include requirements for
  - DOT shipping information,
  - Packaging,
  - Marking,
  - Labeling, and
  - Placarding.

Department of Energy Orders

DOE Orders address

- Compliance with applicable federal and state
  - Laws,
  - Regulations, and
  - Standards.
- Radioactive waste management requirements
  - DOE Order 435.1.

State Drivers for Waste Management

- NMHWA
  - Adopts regulations promulgated under RCRA and
  - Governs the management of hazardous and mixed wastes generated at the Laboratory.
- Laboratory Hazardous Waste Facility Permit
  - Issued and approved by NMED and
  - Identifies
    - Administrative standards and
    - Technical standards.

Internal Drivers for Waste Management

P409	*LANL Waste Management*
P409-1	*LANL Waste Acceptance Criteria (WAC)*
P101-14	*Chemical Management*

Laboratory Policy and Procedures

You can access Laboratory policy and procedure documents at the following URL:

http://policy.lanl.gov

Consequences of Noncompliance

Noncompliance can result in

- Disciplinary action,
- Civil violations,
- Criminal violations, and
- Administrative action.

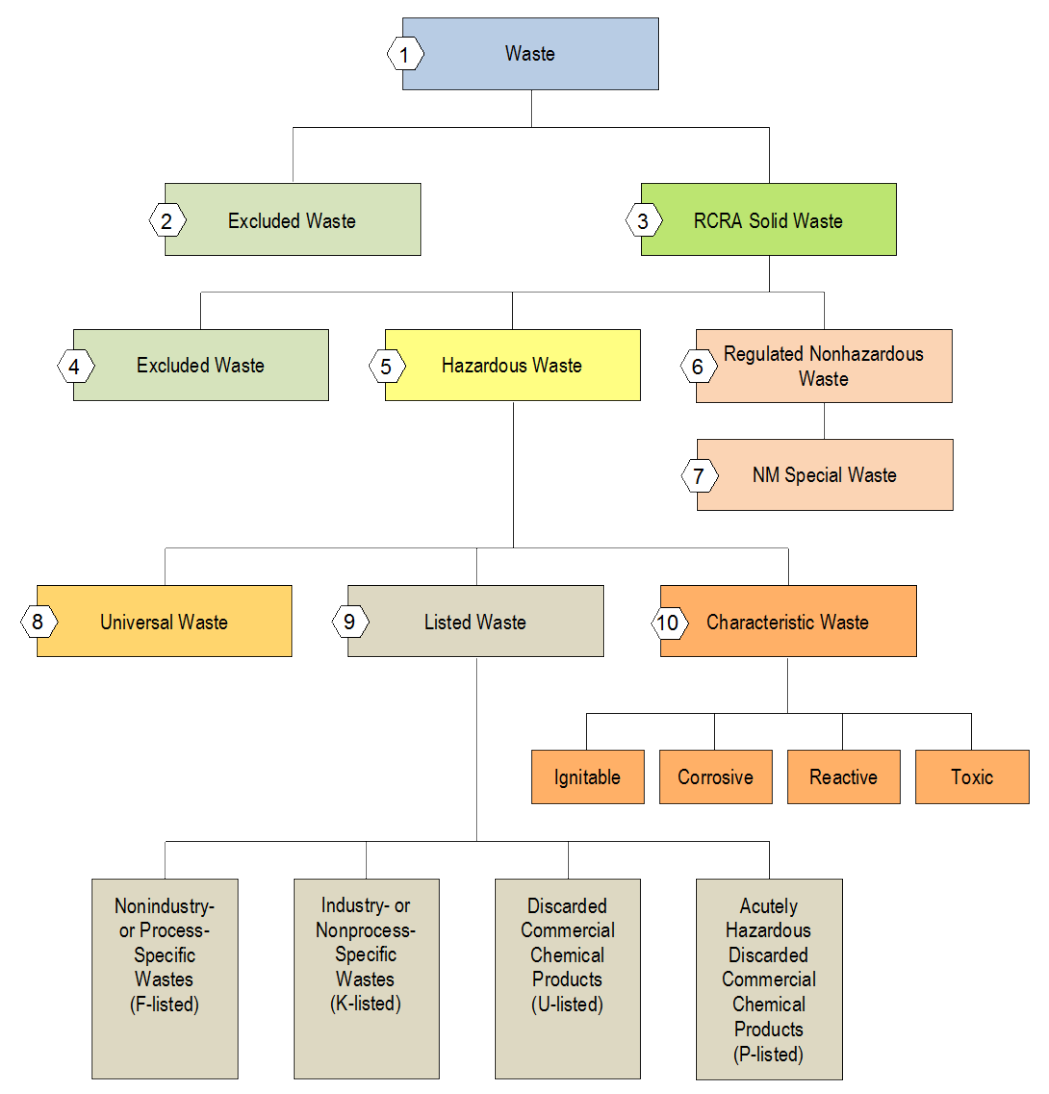
Icebreaker

Module 2: Waste Characterization

Objectives

- Characterize a waste stream to determine whether it meets the definition of a RCRA hazardous waste;
- Recognize regulated RCRA nonhazardous waste streams generated at LANL;
- Recognize the mixture and derived-from rules associated with hazardous and nonhazardous waste streams; and
- Recognize the requirements associated with managing containers.

Waste Characterization Process

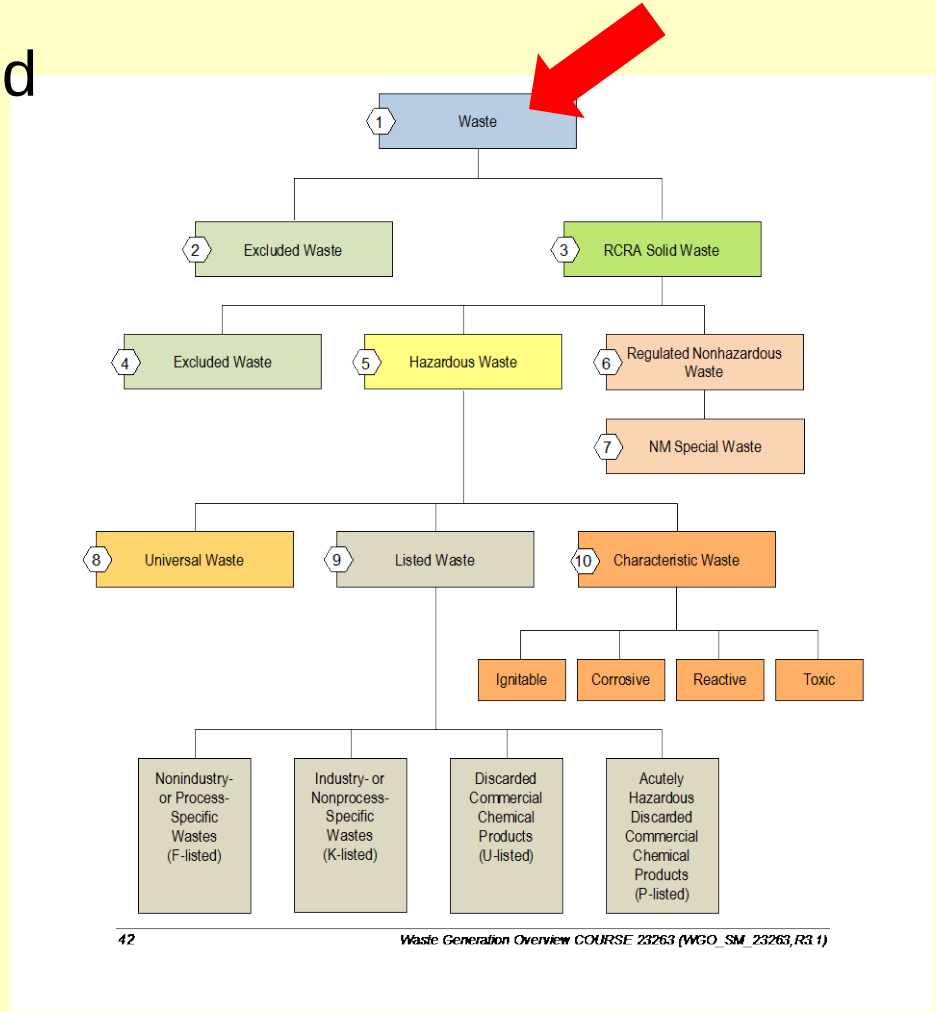


Refer to your waste characterization student handout.

Definition of “Waste”

Waste is a material that

- Is no longer being used for intended purpose,
- Has no further use, and
- Has been discarded.



Solid Waste Exclusions

These materials are excluded from the RCRA solid waste regulations:

- domestic sewage and sewage mixtures (CWA);
- industrial wastewater point source discharges (CWA);
- irrigation return flow (CWA);
- PCB wastes (TACA);
- *in situ* (in-place) mining waste; and
- source, special nuclear, and byproduct materials (Atomic Energy Act).

RCRA Solid Waste

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

- Is considered inherently wastelike;
- Are military munitions identified as 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.

Regulated Nonhazardous Waste

Regulated nonhazardous 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.

New Mexico Special Waste

- Treated formerly characteristic hazardous wastes (TFCH);
- Packing house and killing plant offal;
- Asbestos waste;
- Ash;
- Infectious waste;
- Sludge, except compost that meets the provisions of 40 CFR 503;
- Spills of a chemical substance or commercial product; and
- Petroleum-contaminated soils.

Hazardous Waste Exclusions

Among the materials excluded from RCRA are

- samples
  - in transit to or from analysis,
  - stored in a laboratory before or after analysis, and
  - used in treatability studies.
- household waste

RCRA Hazardous Waste

A RCRA hazardous waste is always a solid waste and may be considered hazardous if it is a/an

- universal waste;
- listed waste; or
- waste that exhibits a hazardous characteristic.

Universal Waste

Universal wastes are common hazardous waste items that are subject to universal waste requirements, such as

- batteries (such as nickel-cadmium and lead-acid);
- pesticides;
- mercury-containing equipment;
- discarded lamps/bulbs that exhibit a characteristic; and
- aerosol cans (in New Mexico).

Listed Waste

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

- The waste exhibits any of the characteristics (ignitable, corrosive, reactive, or toxic);
- The waste is fatal to humans in low doses;
- The waste contains substances that have been shown to have toxic effects on humans; and
- The waste is capable of posing a substantial present or potential hazard to human health or the environment.

Listed Waste (cont)

A solid waste becomes a hazardous waste if the waste stream is classified as

- F-listed,
- K-listed,
- U-listed, or
- P-listed.

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 incapacitating 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.

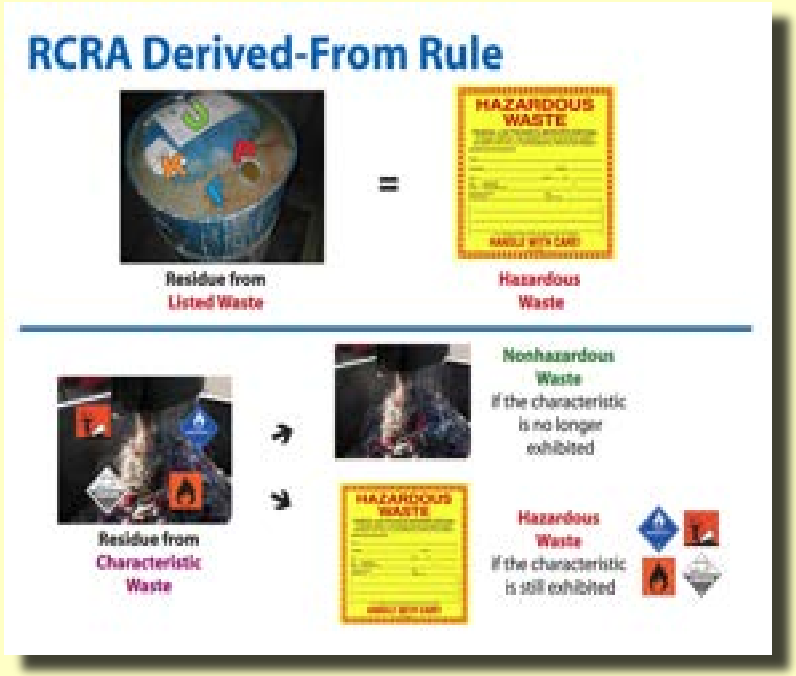
Characteristic Waste (cont)

A solid waste becomes a hazardous waste if it exhibits one of the following characteristics:

- ignitable;
- corrosive;
- reactive; or
- toxic.

Review: Hazardous Waste Rules

- Mixture Rule
- Derived-From Rule



Activity 2

Waste Characterization and Classification

You will work in groups to answer the questions provided.

Empty Containers

Emptied by a method commonly used for that type of Container.

- No more than 1 in. of material remains in the bottom of the container.
- Less than 3% of material remains in a container that has a capacity less than 119 gal.
- Less than 0.3% of material remains in a container that has a capacity more than 119 gal.

Note: A container that once held acutely hazardous waste is considered empty if it has been triple rinsed with a solvent to remove the remaining waste. This procedure is NOT recommended at LANL because it increases the amount of hazardous waste.

Gas Cylinders

- Considered empty when pressure approaches atmospheric.
- If you have excess gaseous material in a cylinder,
  - Contact the Gas Facilities Team for pickup.
- If you have a gas cylinder with unknown content,
  - Manage the cylinder as hazardous waste.

Note: Venting of gas cylinders is prohibited at LANL.

Management of Aerosol Cans

If . . .	then . . .
above atmospheric pressure,	manage as a hazardous waste
discernible liquid is present,	a hazardous waste determination must be made on contents
neither discernible liquid nor above-atmospheric pressure exists,	manage as • solid or radioactive waste – if intended for disposal • scrap metal – punctured if intended for recycling

Unsure?

Contact EPC-CP at 667-6259 for guidance.

Activity 3

Managing Containers

You will work in groups to answer the questions provided.

Module 3: Waste Management Process

Objectives

- Recognize the importance of elements of LANL-specific, cradle-to-grave waste management activities;
- Recognize the responsibilities of waste generators and WMCs at LANL;
- Identify waste management documentation requirements;
- Recognize additional projects and programs that may impact LANL waste management activities; and
- Recognize the difference between processing and treatment.

Cradle-to-Grave Waste Management

- Planning ahead,
- Pollution prevention/waste minimization,
- Characterization,
- Generation,
- Accumulation,
- Packaging and transportation,
- Treatment,
- Storage, and
- Disposal.

Planning Ahead

Critical concerns that require advance planning are

- pollution prevention/waste minimization;
- waste disposal path;
- institutional, facility-, and activity-specific requirements;
- proper containment; and
- disposal costs.

Waste Characterization

Waste characterization is the process of determining the following characteristics of a given waste stream:

- Chemical,
- Physical,
- Biological, and
- Radiological.

Characterization Techniques (cont)

Sampling and Analysis

Note: Sampling and analysis services may be obtained from EPC-CP.

Characterization Techniques (cont)

pp. 41-42

Sampling and Analysis

- If an accurate or complete waste determination cannot be made by acceptable knowledge, waste sampling must be done.
- Sampling and analysis services may be requested by completing the online form at the link in your manual.
- Sampling and analysis results must also be uploaded into WCATS within the waste profile supported by the sample results.

Characterization Techniques (cont)

Acceptable Knowledge

- Collection of information used to support the hazardous waste determination requirements and the radioactive waste acceptance requirements.
- Examples of AK documentation used at LANL may include, but are not limited to
  - Process design documents and
  - Other documented knowledge of processes that lists raw materials or reagents and describes how the waste streams are generated and handled.
- *More examples of AK are found in your manual, beginning on page 42.*

Characterization Techniques (cont)

pp. 42-44

Acceptable Knowledge

Characterization Techniques (cont)

pp. 42-44

Acceptable Knowledge *must be documented*

- AK documentation must be uploaded into WCATS within the waste profile supported by the documentation.
- Enables reviewers to approve the waste profile.
- Makes the documentation readily available to inspectors.
- If AK documentation is missing, sampling and analysis of the waste stream must be completed.

Waste Generation

- Remember, a “waste” is a material that is
  - no longer being used for its intended purpose,
  - has no further use, or
  - is discarded.
- Who is a waste generator?
  - Any facility, owner, or operator whose act or process
    - Produces waste
    - First causes waste to become subject to regulations

Waste Generation (cont)

- Waste streams
  - Hazardous waste,
  - Mixed TSCA waste,
  - TRU and MTRU waste,
  - LLW,
  - MLLW, and
  - Sanitary waste or commercial solid waste.

Waste Accumulation

- Waste generated from LANL operations is temporarily accumulated at central locations.
- Temporary waste accumulation areas:
  - Used oil areas,
  - Satellite accumulation areas (SAAs),
  - <90-day accumulation areas,
  - Universal waste areas,
  - New Mexico special waste storage areas,
  - PCB storage areas, and
  - Radioactive waste storage areas.

Packaging and Transportation

Requirements:

- A DOT-trained and -tested shipper must sign the shipping papers.
- DOT-qualified personnel must perform packaging and shipping.
- Onsite and offsite shipments must meet DOT requirements.

Treatment

- *Treatment is any method, technique, or process designed to change the physical, chemical, radiological, or biological nature of a hazardous waste.*
- Allowable treatment at the Laboratory is
  - Authorized by the RCRA Compliance Group (EPC-CP) for individual generators or
  - Stipulated in the Hazardous Waste Facility Permit.
- Current non-RCRA, onsite treatment includes
  - Liquid LLW (TA-50) and
  - Sanitary wastewater (SWSC facility within TA-46).

Treatment and Storage Facility

- After waste is packaged to meet DOT requirements, it is transferred to a treatment and storage facility (TSF), which is a facility that has a permit—or operates under interim status—to treat, store, or dispose of hazardous waste.
- Waste may be stored at a TSF up to 1 year before being moved to an offsite TSF or buried at LANL.
- A TSF can be issued a permit to treat certain waste streams.

Unallowable Treatment

Evaporation

Note: Before using any form of treatment, contact EPC-CP for approval.

Unallowable Treatment (cont)

Dilution

Note: Before using any form of treatment, contact EPC-CP for approval.

Storage

Storage is the holding of wastes for a temporary period.

Container Storage Areas	Function
TA-54, Area L	Storage of • hazardous waste • mixed low-level radioactive waste (MLLW) • gas cylinders • TSCA and MTSCA waste
TA-54, Area G	Storage of • TRU waste • Mixed TRU waste • hazardous waste on Pad 7 • MLLW in Dome 224 and Pad 7

Disposal

- A disposal facility is any site where hazardous waste
  - Is intentionally placed and
  - Will remain after a TSDF stops operation.
- Disposal is the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid or hazardous waste on or in the land or water.
- At LANL, no RCRA hazardous and/or mixed waste is disposed of onsite. The only waste type ultimately disposed of is non-RCRA solid LLW, which is disposed of at TA-54, Area G. All other waste types are sent offsite for treatment and/or disposal.

Pollution Prevention/Waste Minimization

- Pollution prevention
  - The use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes at the source.
- Waste minimization
  - The reduction of wastes at the source and the recycling of solid wastes.

Note: EPC-PP manages the Laboratory Pollution Prevention/Waste Minimization Program.

P2/Waste Minimization Techniques

- Material substitution,
- Source reduction,
- Treatment,
- Reuse,
- Elimination,
- Good housekeeping,
- Hazard segregation,
- Chemical sharing, and
- Recycling.

Waste Management Projects & Programs

To submit waste to the “Green Is Clean” (GIC) Program,

- Segregate the waste,
- Label the waste Green is Clean and/or place it in a GIC waste container,
- Complete a GIC material disposal request form,
- Send the completed form to the GIC contact, and
- Verify the waste
  - Send the clean waste container to a GIC facility for verification or
  - Perform verification, and send the information to the GIC Program contact.

GIC Waste Container

P2/Benefits

- Meeting LANL/DOE waste minimization and pollution prevention goals,
- Reductions in liabilities,
- Reduction in waste management oversight and resources,
- Improved safety performance,
- Improved public perception, and
- Potential cost savings.

P2/Assistance

- Communicate first with your WMC.
- Recognize the benefits of applying pollution prevention/waste minimization techniques.
- Find out about pollution prevention/waste minimization projects at LANL in which you can participate.
- Learn about LANL's recycling programs.

Activity 4

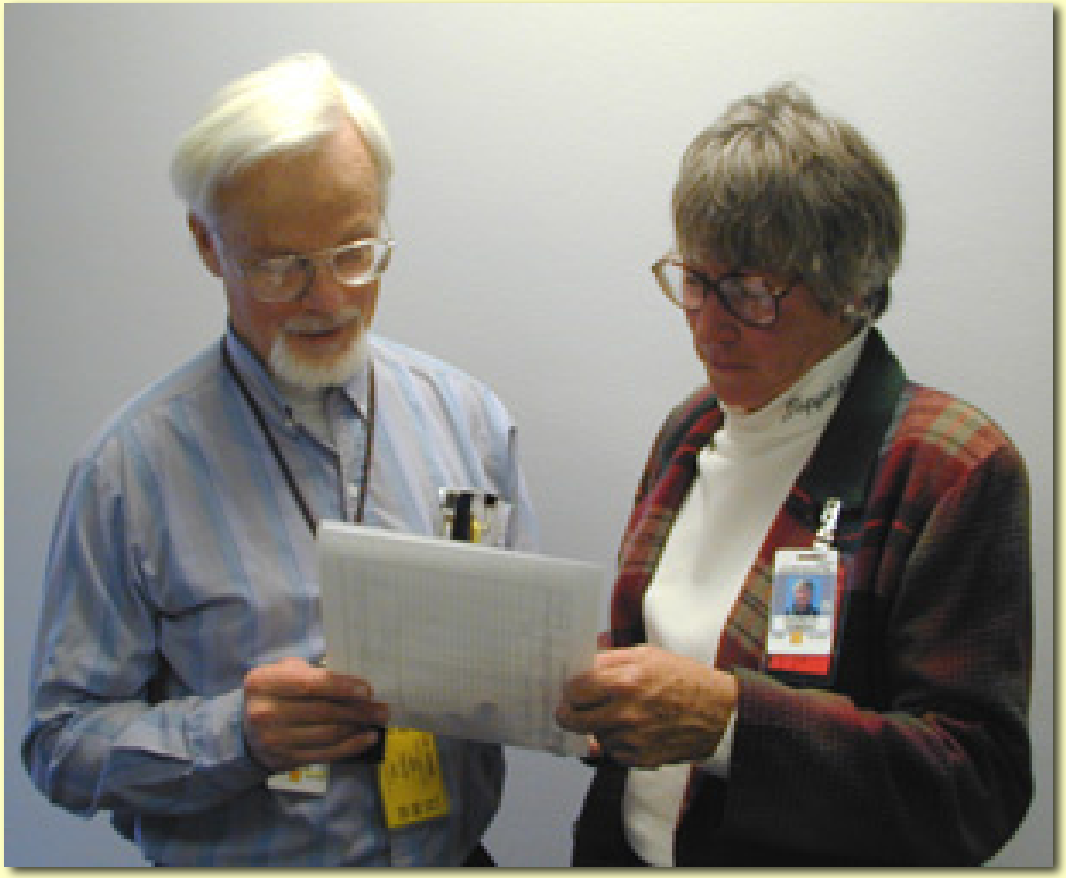
Pollution Prevention/ Waste Minimization

Activity 5

True or False?

Roles and Responsibilities

- Waste generator
- WMC



Generator Responsibilities

- Ensure a disposal path for the waste;
- Segregate waste streams;
- Maintain records;
- Minimize waste;
- Provide waste characterization information;
- Conduct a waste compatibility determination;
- Use the WCATS to prepare, sign, and submit waste documentation to LANL waste operations;
- Ensure that waste is packaged, marked, labeled, and managed to meet all requirements;
- Notify facility managers of a release; and
- Certify waste.

WMC Responsibilities

p. 55-56

- Primary contact on waste-related issues;
- Provides guidance and assistance to generators;
- Represents waste-generating organizations during audits and assessments;
- Ensures that inspections are performed;
- Assists in implementing P2/waste minimization;
- Use the WCATS to prepare, sign, and submit waste documentation to LANL waste operations;
- Assists with completing waste documentation;
- Conducts a waste compatibility determination;
- Coordinates waste transportation;
- Maintains an auditable file of waste documentation; and
- Notifies appropriate personnel of any spills, releases, leaks, or discharges.

Waste Documentation Requirements

pp. 56-57

- WCATS is a software application specifically designed to facilitate management of LANL's waste from cradle to grave.
- The system provides the proper support needed for the characterization, generation, processing, and shipment of all waste created at LANL.
- WCATS: Waste Documentation, course 8504, is designed to familiarize new waste generators in the use of the Waste Compliance and Tracking System. WCATS is the system of record for waste management at LANL.

Waste Documentation Requirements

p. 56-57

Function	Requirements
Documenting the characterization and certification of nonradioactive and radioactive waste	• Generators will work with their WMC to document new waste streams using WCATS. • The new waste stream is reviewed and approved online in WCATS. • Generators are encouraged to print and keep a copy of their waste streams. • Waste stream documentation is active for 1 year. The generator and the WMC must review and certify the waste stream.
Land Disposal Restrictions (LDRs) and underlying hazardous constituent (UHC) information	LDRs and UHCs are documented using WCATS for each waste stream.

Waste Documentation Requirements

pp. 57- 58

Waste Disposition Request (WDR) documents waste pickup requests	• The WDR must be entered by the WMC into the WCATS system for approved wastes (wastes with an activated WCATS waste stream number) requiring pickup. • If the WDR is approved, arrangements for waste pickup are made through the contact person (usually the WMC). • A WDR is required for each waste pickup location; for bulk shipments, a WDR is required for each WCATS waste stream number.
UHWM Accompanying hazardous or mixed waste streams transported across public roads	• The UHWM must – be completed by a DOT-trained and -tested shipper and – accompany waste to its ultimate destination. • The owner or operator of the receiving TSF must return a copy of the UHWM to the generator as verification that the waste was received. • LANL is required to maintain copies of the UHWM for each offsite waste shipment as verification that the waste delivery reached its destination.

Module 4: Waste Accumulation Areas

Objectives

- Recognize the types of temporary waste accumulation areas at LANL;
- Recognize the general and specific requirements for temporary waste accumulation areas at LANL;
- Recognize the purpose of performing inspections;
- Identify noncompliance areas by inspecting a mock setup of a temporary waste accumulation area located in the classroom; and
- Recognize initial response recommendations for leaks and spills.

Temporary Waste Accumulation Areas

- Used oil areas,
- Satellite Accumulation Areas (SAAs),
- <90-day accumulation areas,
- Universal waste areas,
- New Mexico special waste storage areas,
- PCB storage areas,
- Radioactive waste storage areas, and
- Radioactive waste staging areas.

<90-Day Storage Area

Universal Waste Area

Waste Segregation

Setting Up an Accumulation Area

- Before setting up a temporary accumulation area,
  - Consider waste quantities over time and the types of waste being generated,
  - Contact the RCT and/or WMC for the storage of radioactive or mixed wastes,
  - Register the accumulation area with EPC-CP, and
  - Abide by applicable fire codes.
- The accumulation area
  - Should be free of ignition sources and
  - Should preferably be dry and sheltered.

Container Requirements

Waste containers must be

- In good condition,
- Properly labeled,
- Closed except when adding or removing waste,
- In secondary containment if holding liquids at a TSDF,
- Compatible with the waste generated, and
- Segregated if some waste streams are incompatible with others.

Damaged Container

Secondary Containment

Secondary Containment in an SAA

Labeling Requirements

Container labels must

- Include the generator's name and WPF or WCATS waste stream ID number on the label or inventory log (or container shall be marked "WPF [or waste stream ID] Number Pending"),
- List the major waste constituents and include the words "Hazardous Waste,"
- Be legible and not faded,
- Be placed on a container that fully encloses the waste,
- Include the words "Hazardous Waste" for waste that is pending analysis, and
- Include the words "Radioactive" and "Hazardous Waste" if the container holds mixed waste/

Radioactive Waste Drum

Signage and Segregation Requirements

p. 62 - 63

- Signs indicating the type of temporary accumulation area must be
  - Posted
  - Visible
- Segregation
  - Segregate hazardous waste and other waste types if waste constituents are incompatible
  - Use a dike, berm, wall, or other barrier
  - Package liquids and solids separately

Satellite Accumulation Area

p. 64 - 65

Specific Requirements for Temporary Waste Accumulation Areas

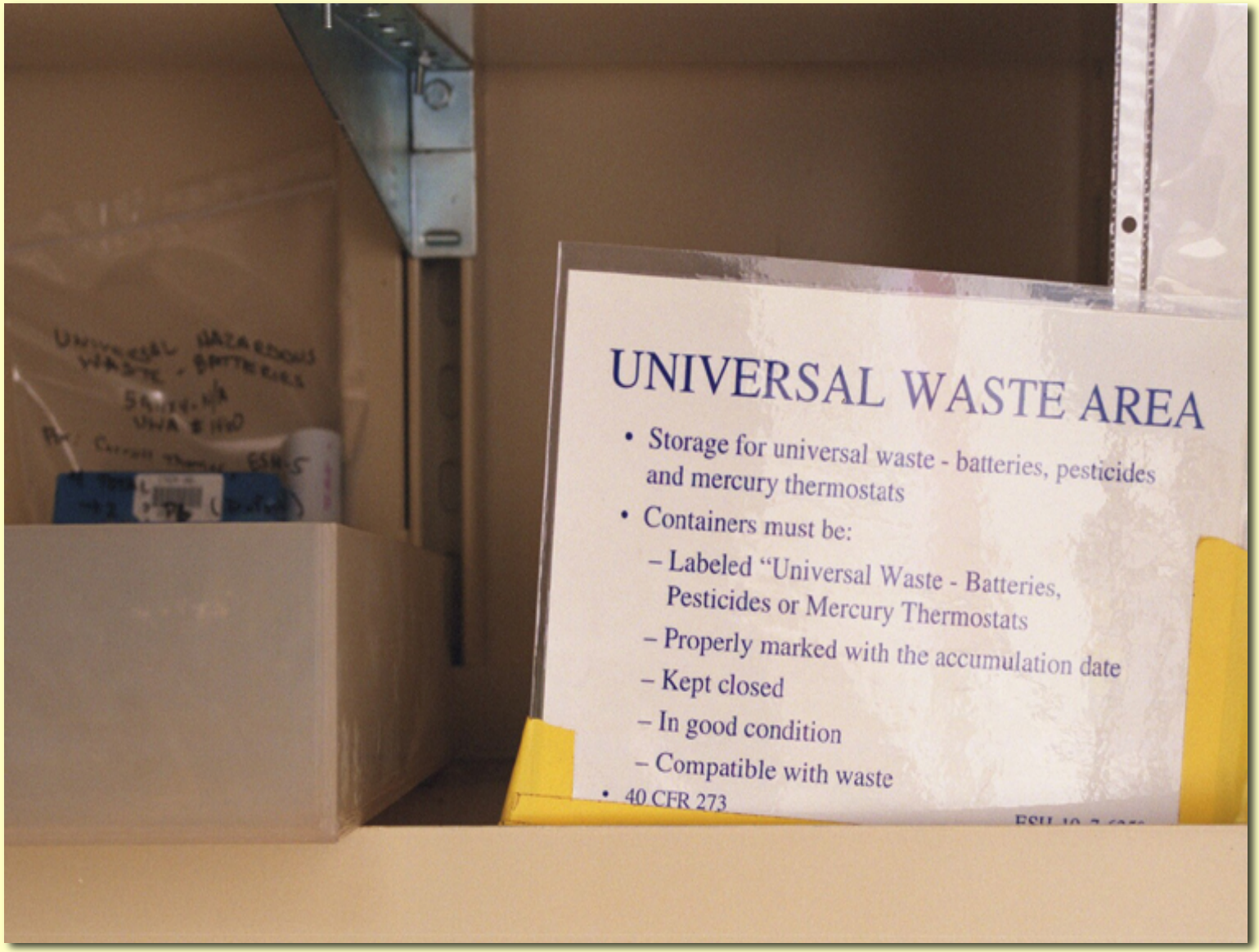
pp. 63-65

- Used oil area
- Satellite Accumulation Area (SAA)
- <90-day accumulation area
- Universal waste area
- NM Special Waste storage area
- PCB storage area
- Radioactive waste storage area

Satellite Accumulation Area

pp. 64

Universal Waste Area



New Mexico Special Waste Storage Area

PCB Storage Area

Radioactive (TRU) Waste Storage Area

Inspections

Because of the consequences associated with mismanagement of hazardous and/or mixed waste, waste generators must comply with LANL waste management policies and procedures, as well as federal and state regulations.

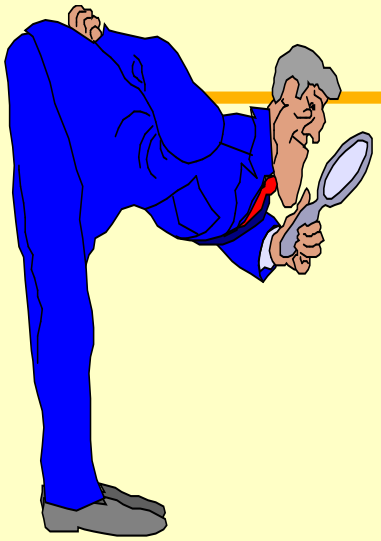
Purpose for Inspections

- Protection of human health and the environment
- Compliance with federal and state regulations
- Waste minimization and pollution prevention
- Identification and correction of problems

ECP-CP Self-Assessment Process

- Performs inspections several times per year to help generators.

Activity 6



Inspections & Noncompliances

- Inspect the SAA located at the back of the classroom.
- Record as many waste management violations as you can find.
- Share your findings with the class.