LA-UR-16-29474
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Title: RCRA Personnel Training, Course 7488

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Intended for: Training

Issued: 2017-01-30 (rev.1)

RCRA Personnel Training

COURSE 7488

January 2017

Los Alamos
NATIONAL LABORATORY
EST. 1943

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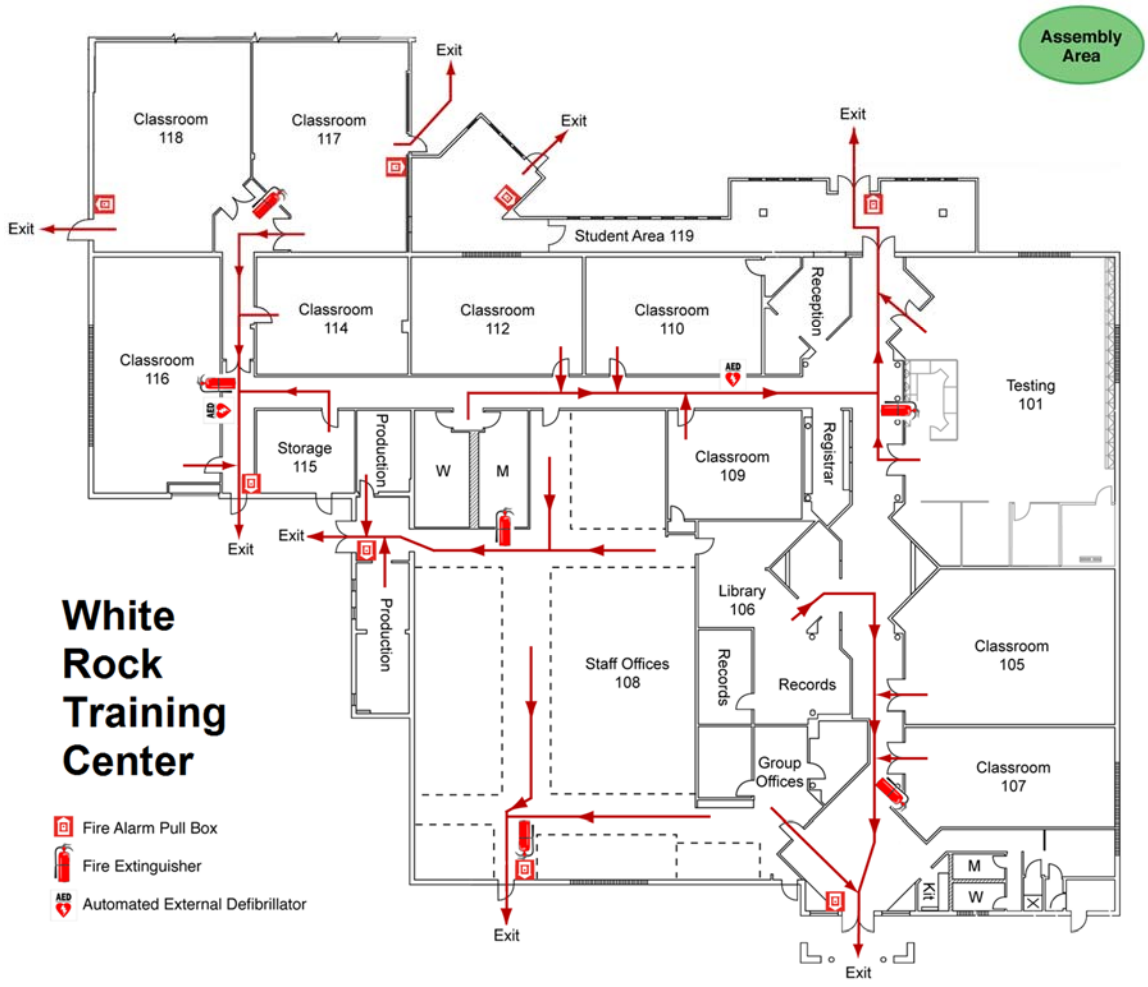

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Course Number: 7488
January 2017
LA-UR-16-29474
Controlled Document Number: RCRA_Personnel_7488_SM,R5.0

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Introduction

Course Overview

Federal and state regulations require hazardous and mixed waste facility workers at treatment and storage facilities (TSFs) and <90-day accumulation areas to be trained in hazardous and mixed waste management. This course will refamiliarize and update <90-day accumulation area workers, TSF workers, and supervisors of TSF workers regarding

- waste identification (ID) and characterization requirements,
- pollution prevention (P2) opportunities,
- storage area requirements,
- emergency response procedures, and
- record-keeping requirements.

Course Objectives

When you have completed *RCRA Personnel Training* COURSE 7488, you will be able to

- recognize generator and waste acceptance criteria (WAC) responsibilities associated with waste ID and characterization;
- recognize the relevancy and importance of the LANL P2 Program;
- recognize the storage area requirements for <90-day accumulation areas and TSFs;
- identify the purpose of and major elements in the emergency management plan (EMP), contingency plan, and emergency and site-specific plan; and
- recognize the importance of record keeping and reporting as required by federal and/or state environmental regulatory agencies.

Target Audience

Los Alamos National Laboratory (LANL) personnel who work in TSFs or <90-day waste accumulation areas are required by LANL Procedure (P) 409, *Waste Management*, to take this course.

Audience	Course Name and COURSE	Frequency
Generators and WMCs	**Waste Generation Overview Live* COURSE 23263 *Waste Generation Overview Refresher* COURSE 21464	Once Every 36 months
Persons who work in or 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 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.*

Prerequisite Training Requirements

Students are required to complete *Waste Generation Overview Live* COURSE 23263 before enrolling in *RCRA Personnel Training* COURSE 7488. Additional site- and job-specific training requirements also may apply.

Course Limitations

This course presents basic roles and responsibilities for LANL personnel who work in TSFs and <90-day waste accumulation areas; it also identifies the regulations, policies, and requirements under which these workers perform work. It does not detail facility- or job-specific training that may be required by facilities that operate TSFs and <90-day waste accumulation areas.

About This Course

RCRA Personnel Training COURSE 7488 is a 4-hour live course that is mandatory for LANL personnel who perform work in a LANL TSF or a <90-day waste accumulation area. This course consists of an introduction, six 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

AK	acceptable knowledge
CAS	Chemical Abstracts Service
CFR	Code of Federal Regulations
CWA	Clean Water Act
DOE	Department of Energy
DOT	Department of Transportation
EMP	Emergency Management Plan
EMS	Environmental Management System
EO-EM	Emergency Management (group)
EPA	Environmental Protection Agency
EPC-ES	Environmental Stewardship Office
ESH	environment, safety, and health
HMTA	Hazardous Material Transportation Act
HPI	human performance improvement
HSWA	Hazardous and Solid Waste Amendments
ID	identification
IRF	inspection record form
ISO	International Organization for Standardization
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
LDR	land disposal restriction
LLW	low-level (radioactive) waste
LOL	List of Lists
MSS	Maintenance and Site Services
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMHWA	New Mexico Hazardous Waste Act
NNSA	National Nuclear Security Administration
NOV	notice of violation
NPDES	National Pollutant Discharge Elimination System
ORP	Outfall Reduction Program
P	Policy
P2	pollution prevention
PCB	polychlorinated biphenyl

RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
SAA	satellite accumulation area
SDS	safety data sheet
TCLP	toxicity characteristic leaching procedure
TRU	transuranic
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
TSDF	treatment, storage, and disposal facility (for offsite disposal
TSF	treatment and storage facility
UHWM	uniform hazardous waste manifest
WAC	waste acceptance criteria
WCATS	Waste Compliance and Tracking System
WDR	waste disposal request
WMC	waste management coordinator
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: satellite accumulation area (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 (TSF'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 of at commercial or municipal solid waste facilities.
construction and demolition debris	Materials generally considered to be not 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. It 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 Department of Energy (DOE) to describe cleanup of DOE facilities and lands.
general storage area	A polychlorinated biphenyl (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 by-product. The use of the generic term “mixed waste” shall refer to both mixed low-level waste (LLW) and mixed TRU.
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 (DOT).
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, acceptable knowledge, 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.
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 treatment and storage facility (TSF) or treatment, storage, and disposal facility (TSDF).
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 20years, 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.
Treatment, storage, and disposal facility (TSDF)	A permitted or interim status hazardous waste management unit used for offsite disposal, 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.

Module 1: RCRA Provisions

Module Overview

When the generator disposes of the waste, he/she is responsible for determining whether a material is a solid waste, hazardous waste, mixed waste, or discarded commercial chemical product. This module presents information on waste characterization methods, waste categories, hazardous waste types regulated under the Resource Conservation and Recovery Act (RCRA), specific waste exclusions, generator treatment requirements, chemical sharing, and waste generator and waste acceptance criteria (WAC) waste management coordinator (WMC) responsibilities.

Module Objectives

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

- the responsibilities of federal and state regulatory agencies,
- characterization of waste [using acceptable knowledge (AK) and sampling and analysis] and the associated generator responsibilities,
- categories and types of regulated hazardous and nonhazardous waste,
- exclusions to regulated waste categories,
- generator treatment requirements and limitations, and
- considerations for handling excess commercial chemical products that are no longer needed.

Your Responsibility

Each worker at LANL is responsible for protecting the environment. This responsibility begins by being able to identify a material as being a waste and managing it according to the applicable regulations.

It is important for generators to become well acquainted with the many resources available to assist in waste characterization and waste management.

Federal and State Regulatory Agencies

The following table describes the federal and state regulatory agencies that define waste management responsibilities.

Agency	Description
Federal	
Environmental Protection Agency (EPA)	• serves as the lead federal regulatory agency • regulates solid wastes, including hazardous/mixed wastes • has primary responsibility to promulgate new regulations • has enforcement authority at the federal level
Occupational Safety and Health Administration	sets training and worker safety requirements for hazardous waste workers
Department of Energy (DOE)	• owns LANL • self-regulates radioactive waste • issues orders • has shutdown authority
Department of Transportation (DOT)	sets shipping and manifesting requirements for hazardous materials, substances, and wastes
State	
New Mexico Environment Department (NMED)	• serves as the lead state regulatory agency • regulates solid wastes, including hazardous/mixed waste • promulgates state regulations that are at least as stringent as federal regulations • has enforcement authority at the state level

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 EPA to regulate solid and hazardous waste management and disposal. RCRA legislation has 10 subtitles, 4 of which are regulated. The following table outlines two 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 TSF standards;
- recycling standards;
- controls on land disposal;
- permitting requirements;
- state program requirements;
- used oil management standards;
- universal waste management standards; and
- underground storage tank requirements.

Hazardous and Solid Waste Amendments

The Hazardous and Solid Waste Amendments of 1984 (HSWA) significantly expanded the regulatory scope of RCRA and introduced requirements to ensure that groundwater is protected from chemical contamination. Requirements under 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 concern that hazardous chemicals leaching from land-disposed waste could migrate through the soil and ultimately contaminate the groundwater, the EPA imposed stringent controls on 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 land disposal. The LDRs specify concentration- and technology-based treatment standards.

The EPA has developed treatment standards for all 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 land disposal.*

Toxic Substances Control Act

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

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

TSCA is intended to provide protection from toxic substances manufactured, processed, distributed, or used in the United States. 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.

Hazardous Material Transportation Act

The DOT issues regulations, through the Hazardous Material Transportation Act (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 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 used 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.*

Department of Energy Orders

LANL is operated by Los Alamos National Security, LLC (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.

State Drivers for Environmental Protection

New Mexico Hazardous Waste Act

The New Mexico Hazardous Waste Act (NMHWA) is implemented through the state hazardous waste regulations found in Title 20 of the New Mexico Administrative Code (NMAC) 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 NMED is authorized by the EPA to implement and enforce RCRA regulations.*

LANL Hazardous Waste Facility Permit

RCRA and state regulations require LANL to have a permit to operate TSFs. LANL's Hazardous Waste Facility Permit, issued through NMED, identifies standards for facility operation, including administrative and technical standards.

The first permit, which was issued in November 1989, is renewed every 10 years. LANL's current permit was signed November 30, 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

Los Alamos National Security/DOE Contract

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

- environmental restoration and waste management;
- environment, safety, and health (ESH); and
- waste minimization/P2.

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 the renewal of the contract.

LANL Policy and Procedures

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.

The following table lists some requirements that impact LANL's waste management operations.

Requirement	Title
P409	*LANL Waste Management*
P101-14	*Chemical Management*
P409-1	*LANL Waste Acceptance Criteria*

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 Official Documents link on the LANL homepage.*

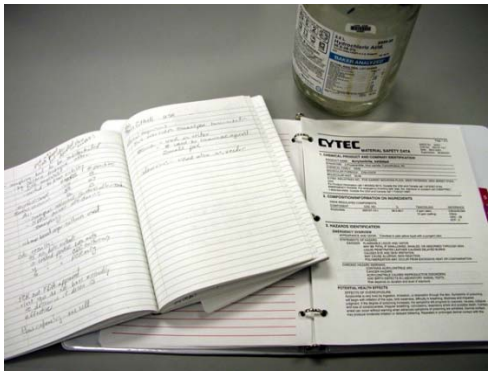
Waste Characterization

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

Generators are responsible for properly characterizing their waste stream(s). Characterization of a waste stream must be accurate to determine segregation requirements for storage, treatment alternatives, and/or disposal requirements. Inadequate characterization can lead to improper disposal, resulting in fines and penalties, environmental contamination, and pollution (for example, ground and/or surface water, soil, and air pollution).

The two methods of waste characterization are

- AK—acceptable knowledge, and
- sampling and analysis.



Log books, safety data sheets (SDSs), and container labels may aid in waste characterization.

Acceptable Knowledge

AK is a method used by the waste generator to document characterization of wastes in lieu of approved sampling and analysis. Sampling and analysis by approved methods is the most defensible means of waste characterization; however, AK may be substituted for analytical data if it is complete and properly documented.

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, unreviewed safety questionnaire determinations, and technical safety requirements	N/A
• Standard operating procedures, hazard control plans, activity hazard analyses, and/or detailed operating procedures	N/A

Note: *Integrated work documents regularly cover a facility or number of processes and are typically too broad and general to provide specific process descriptions and waste descriptions.*

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 the RCRA K-listed waste generating process. • Generator/subject matter expert 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-explosives 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

AK Sources	Examples
• 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 log book pages or excerpts may be attached to Waste Disposal Requests (WDRs) 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
• Site databases (e.g., chemical inventory database for Superfund Amendments and Reauthorization Act Title III).	N/A
• Documented site personnel interview information.	N/A
• Correspondence, such as memoranda, letters, 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

• SDSs, product labels, and other product packaging information, particularly for trade-name or proprietary products (e.g., “WD-40”)	• Waste streams consisting of discarded commercial chemical products, reagents, or chemicals of known physical and chemical composition (e.g., RCRA P-listed and U-listed wastes).
• Documented visual inspections that can be used to identify or confirm the physical characteristics and packaging of a waste (e.g., visual inspection forms, which can be explicit in the type of information to be collected, or detailed procedures on how these observations are recorded).	• Characterizing waste streams that contain heterogeneous materials, where the physical nature of the waste stream does not lend itself to taking a representative sample (e.g., laboratory personal protective equipment).
• Documentation that demonstrates that surrogate materials accurately reflect the characteristics of the waste stream in question.	N/A

Ensure that the AK documentation is relevant and traceable to a waste stream and not merely a list of information sources for a particular process operation. Document information that is accurate, sufficient, current (i.e., updated), and relevant to the waste stream’s generation, characterization, and management. AK should include, at a minimum:

- A description of the waste generating process, to include
  - A general description of physical/chemical process(s) generating the waste;
  - What materials or inputs are used in the process(s); and
  - How the materials/reagents are used (i.e., are organics used for their solvent properties, or as ingredients).
- A physical, chemical, and regulatory description of the waste produced.
- A basis for how the waste constituents and contaminants are identified and bounded (e.g., how their min-max ranges are determined).

- A description of the process controls that are in place to ensure generated waste remains within the bounds of the WSP.

Consider including the following information for each waste stream, or related waste stream:

- The specific location of the waste-generating process/operation.
- The time period of generation.
- The person or persons responsible for the process operations and for waste management, including organization and point of contact information (i.e., the WMC).

Any assumptions made should be identified and documented.

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 missing, it is imperative that sampling and analysis of the waste stream be completed.

For proper characterization and waste management, samples may need to be collected and analyzed to determine the contents of the waste.

Sampling and Analysis

This waste is so potentially dangerous that you should call SEO-3.

Sampling and analysis can also be used to characterize waste and is usually performed when any of the following conditions exist.

- The generator does not have sufficient AK to characterize the waste,
- unknown constituents exist in the waste stream, or
- analysis is required and/or requested by the receiving TSDF offsite.

Note: *Workers may request sampling and analysis services by filling out the form at the following link:*

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

Hazardous Waste Facility Sampling and Analysis Requirements

The following sampling and analysis requirements are specified in the waste analysis plan of the LANL Hazardous Waste Facility Permit.

- All routinely generated waste streams with documented waste profiles must be analyzed annually to verify that they have not changed.
- A process change that may affect the waste requires that the waste be analyzed no later than the next time the waste is generated.
- Waste characterization documentation must be recorded in the facility operating record or WCATS.

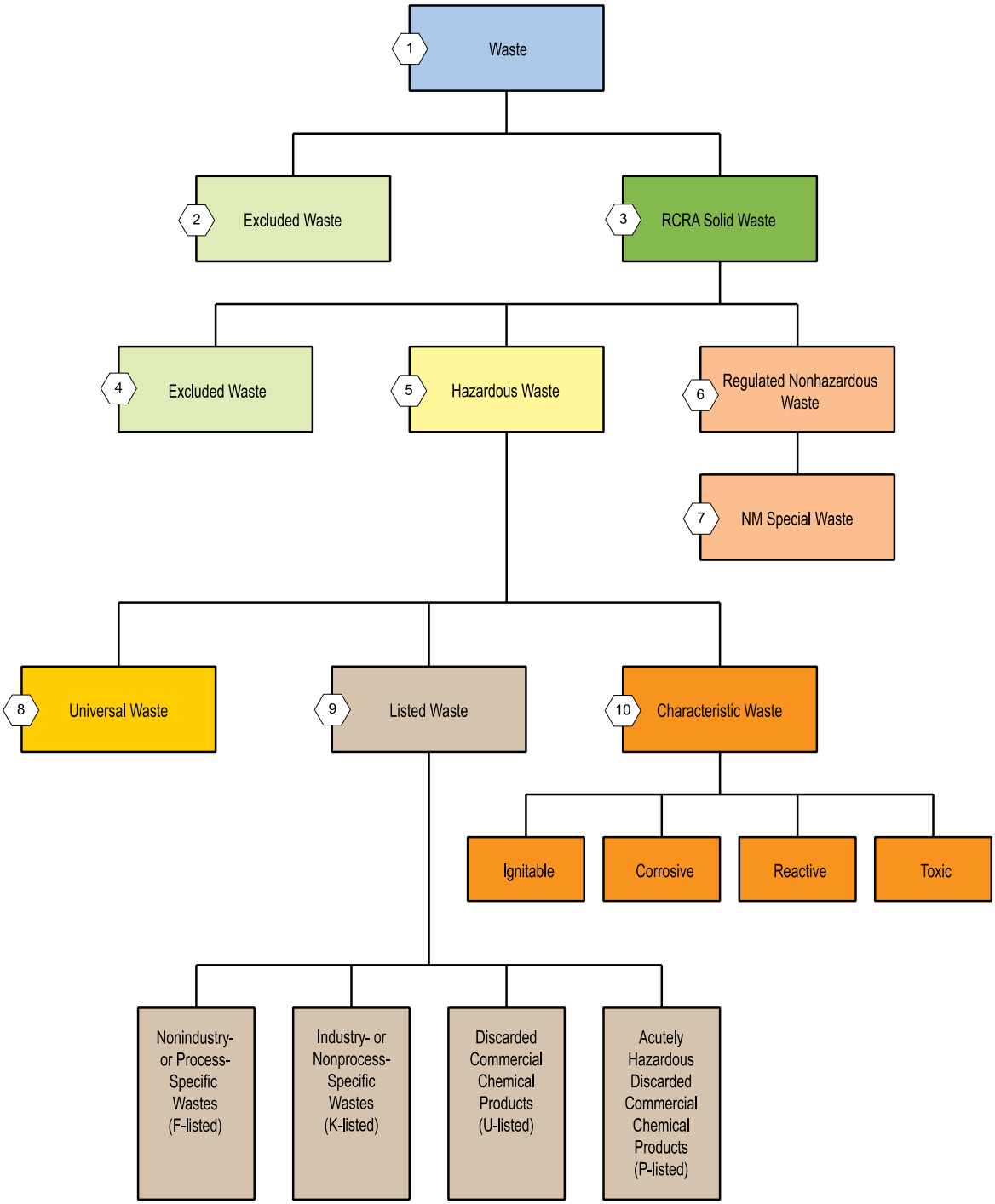
Sampling and Analysis *"Do's and Don'ts"*

- DO submit a request for analysis.
- DO recharacterize waste when the process changes.
- DO sample or characterize all unknown waste.
- DO NOT characterize waste without proper training.
- DO NOT guess at RCRA constituent levels.
- DO notify your WMC when the process has changed.

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 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 handle, transport, treat, store, and/or dispose of the waste safely.

If characterization indicates that material is a waste, then the next step is to determine the category. The following diagram provides a logical flow for making a waste, solid waste, or hazardous or nonhazardous waste determination. A detailed explanation of this process begins on the next page.


1
Waste
2
Excluded Waste
3
RCRA Solid Waste
4
Excluded Waste
5
Hazardous Waste
6
Regulated Nonhazardous Waste
7
NM Special Waste
8
Universal Waste
9
Listed Waste
10
Characteristic Waste
Ignitable
Corrosive
Reactive
Toxic
Nonindustry- or Process-Specific Wastes (F-listed)
Industry- or Nonprocess-Specific Wastes (K-listed)
Discarded Commercial Chemical Products (U-listed)
Acutely Hazardous Discarded Commercial Chemical Products (P-listed)

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 are 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;
- military munitions identified as a solid waste;
- recycled; or
- 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 ***RCRA 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 wastes;
- packing house and killing plant offal;
- regulated 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
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 ***Note:*** *Waste generated from household commercial chemical products used at LANL that exhibits a RCRA characteristic or contains listed constituents must be managed as hazardous waste.*

5 ***RCRA Hazardous Waste***

A RCRA hazardous waste is always a solid waste and may be considered hazardous if it is a **universal** waste, **listed** waste, or 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 alternate methods of disposal. Universal wastes are subject to the universal waste requirements of 40 CFR 273 and 20 NMAC 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.

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 incapacitating 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.

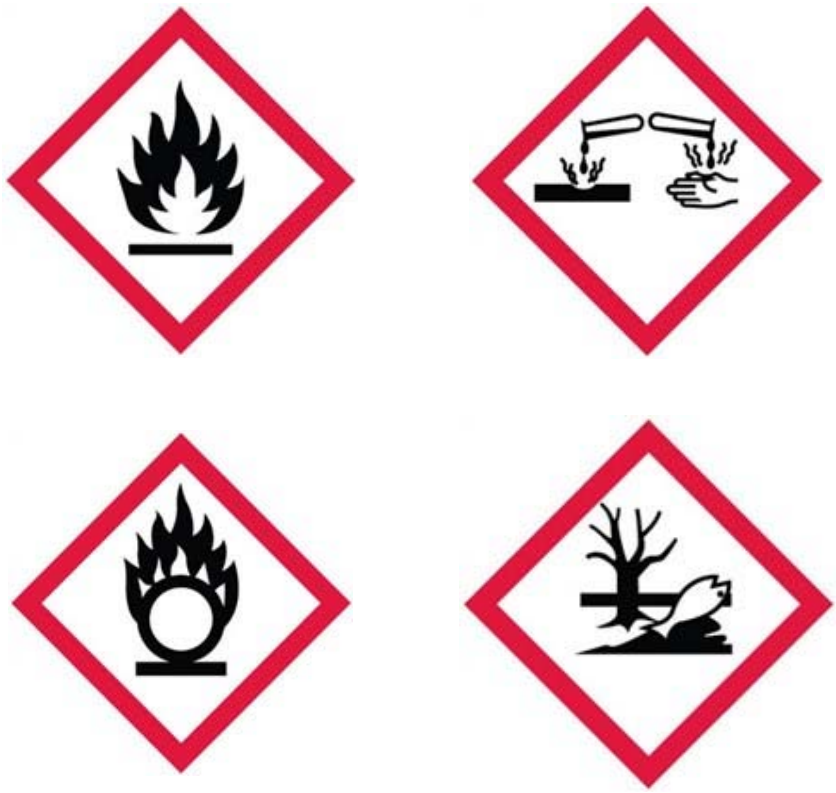
10 ***Characteristic Waste***

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.



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 DOT • DOT oxidizer	• naphtha • ethanol
corrosive D002	• pH of ≤2.0 or ≥12.5 or • a liquid that corrodes steel at a rate greater than 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 • 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., trichloroethylene) • certain metals (e.g., arsenic, barium, lead) • certain pesticides

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

EPA List of Lists Database

The EPA List of Lists (LOL) is a tool for characterizing chemicals (see to http://yosemite.epa.gov/oswer/lol.nsf/searchform?openform). The LOL is a searchable database of EPA's Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act and Section 112(r) of the Clean Air Act. The database lists the name, Chemical Abstracts Service (CAS) number, and RCRA code (if any) for each chemical.

Generator Treatment Requirements and Limitations

Before treating waste, the generator must get approval from the LANL RCRA Compliance Group. Certain LANL treatment procedures are not allowed on waste streams. The following table lists three of these procedures and explains why they are not allowed.

Treatment Procedure	Why It Is Not Allowed
evaporation	According to the regulations implementing RCRA, waste containers/tanks must be closed, except to add or remove waste. Evaporation requires waste containers/tanks to be opened, which would result in noncompliance.
dilution	Dilution is prohibited, under RCRA LDRs, as a substitute for legitimate treatment for most wastes. Dilution may eliminate the waste characteristic, but it does not reduce the amount of the chemical, and the chemical may find its way into the environment.
thermal treatment	To conduct thermal treatment, a permit is required. Because the regulations do not require <90-day accumulation areas to be covered by a permit, generators must *not* perform thermal treatment in nonpermitted <90-day accumulation areas.

Note: *Before using any form of treatment, contact the LANL RCRA Compliance Group or your WMC to determine whether that particular form of treatment is allowable. Generator treatment is rare and must be approved by the LANL RCRA Compliance Group.*

RCRA Hazardous Waste Rules

Mixture Rule

The following table illustrates the 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

The following table illustrates the 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.

Excess Commercial Chemical Products

LANL has received a significant number of violations for failing to identify a material as being a hazardous waste. Most of the time, this violation is a result of individuals failing to properly distinguish between a waste and a product. The following information may help you in distinguishing between a commercial chemical product and a waste.

Sharing Chemicals at LANL

Unused chemicals that can no longer be used for their intended purpose or have no further use and that exhibit a characteristic or contain listed constituents must be managed as hazardous waste. If you are aware that you have a chemical that you can no longer use, you must take initial action via LANL's chemical inventory system.

Sharing chemicals can prevent them from becoming hazardous waste. For excess commercial chemical products that are still usable, generators are encouraged to identify them as shared on LANL's chemical inventory system, known as *ChemLog*. ChemLog allows for the sharing of chemicals across LANL and is a useful tool in eliminating or minimizing the amount of unused/unspent commercial chemical products requiring disposal as hazardous waste.

Waste Management Coordinators

Each group, division, or facility has a WMC who serves as the primary contact for waste management and P2/waste minimization efforts. The WMC is familiar with the general processes and procedures that generate waste and can to assist you in meeting federal, state, and internal waste management requirements.

Activity 1: Waste Characterization and Classification

Purpose

As RCRA facility workers or <90-day accumulation area workers, it is important to recognize and classify waste streams for appropriate handling and management. This activity will provide you with a review of the hazardous waste determination process, which may play an essential role in your daily activities.

Instructions

The following table provides instructions for this activity.

Step	Instructions	
1	The instructor will divide the class into groups.	
2	Each group will split into two teams and select a team captain, a stack of chips, and a matching die. ***Note:*** *The team captain is responsible for stating the answer to a question.*	
3	One team will go first and roll the die.	
4	**If . . .**	**then . . .**
	the playing team rolls the number 1, 2, 3, 4, or 5,	• a player from the opposing team will draw a question card and read it aloud, and • the captain of the playing team will have 1 minute to answer the question.
	the playing team answers the question correctly and within 1 minute,	• the playing team will cover any unoccupied space on the game board that matches the number on the die and • play will go to the opposing team.
	the playing team answers the question incorrectly,	• the playing team will lose its turn and • play will go to the opposing team.
	the playing team rolls the number 6,	
	the playing team rolls a number and all spaces on the game board that match the number are occupied,	
5	Play alternates between the two teams at the completion of each turn.	
6	The first team to cover one row of numbers on the game board wins. ***Note:*** *The row may be horizontal, vertical, or diagonal.*	

Module 2: Pollution Prevention

Module Overview

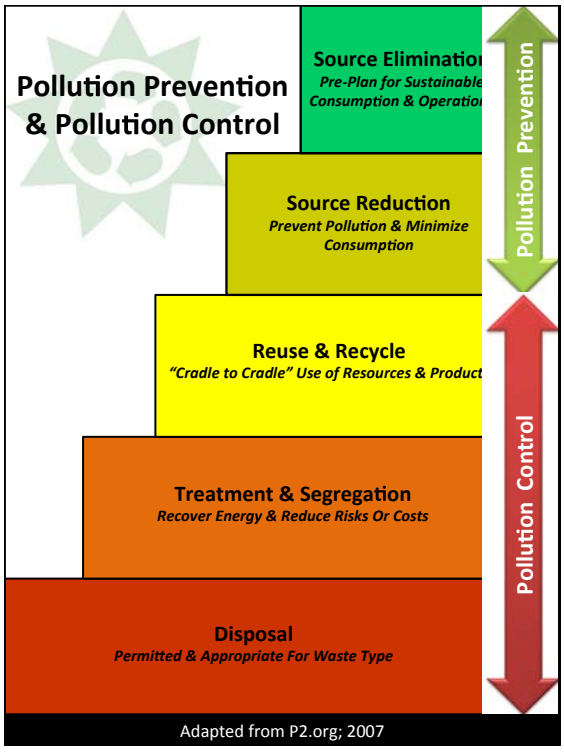
This module presents a description of P2, the regulatory drivers for P2 at LANL, the goals of the LANL P2 Program, performance measures that are monitored by the DOE, and techniques that may be used to prevent or minimize pollution.

Module Objectives

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

- the regulations that guide P2 practices at LANL,
- the P2 Program services provided to LANL operations,
- the performance indicators used by DOE to assess LANL's P2 efforts, and
- P2 techniques that may be used to prevent or minimize pollution.

What is P2?



Pollution Prevention (P2) describes activities that eliminate or reduce pollution generated by Laboratory operations, including the

- consumption/degradation of resources; and
- generation of wastes, effluents, and discharges.

In contrast to pollution control (or "end-of-pipe") strategies that manage pollutants after they are formed, P2 increases the efficiency of processes and results in elimination or reduction of pollutants at the source. The P2 hierarchy at left describes the P2 and pollution control strategies that LANL has successfully adopted and implemented since the mid-1990s.

Federal and State Regulatory Drivers for P2

The President of the United States, Congress, DOE, and NNSA recognize the importance of P2. The following table lists regulatory drivers for implementing P2 at federal facilities, including those owned by DOE.

Pollution Prevention Act of 1990
Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance
Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management
DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets
DOE Order 436.1, Departmental Sustainability
DOE Policy 450.4A, Integrated Safety Management Policy
DOE Annual Strategic Sustainability Performance Plan

Additionally, NMED state operating permits require signatories of waste manifests to attest that all possible actions to reduce or eliminate waste were taken before wastes were disposing of.

LANL Drivers for P2

Governing Policy on Environment

LANL's Governing Policy on Environment describes the basis for executing work and accomplishing missions that have the potential for environmental interactions and explicitly states LANL's commitment to continual improvement and pollution prevention.

Environmental Management System (EMS)

DOE O 436.1 and the Prime Contract require LANL to implement and maintain an Environmental Management System (EMS) that meets the requirements of International Organization for Standardization (ISO) environmental management systems standard ISO 14001. The LANL EMS places significant emphasis on pollution prevention and continual improvement and is

- a consistent, comprehensive, and documented management of all activities, products, and services with environmental interactions;
- a strategic planning tool for addressing both immediate and long-term risk; and
- a framework for setting and obtaining environmental performance improvement objectives, targets, and metrics.

P409, *Waste Management*

LANL Procedure (P)409, *Waste Management*, contains requirements and tools for waste elimination/minimization and for reuse and recycling.

P2 Program at LANL

The P2 Program at LANL anticipates future resource use, discharge, waste, and effluent trends and takes action before missions are negatively impacted. The P2 Program also provides technical support to enable LANL employees to identify and implement source reduction and elimination projects that

- improve LANL's environmental performance,
- reduce LANL's environmental risk,
- lower operating and disposal costs, and
- enhance safety of operations.

The P2 Program also promotes sustainable practices, including

- chemical substitution and chemical share programs;
- sustainable acquisition (green purchasing);
- sustainable (green) building design, operations, and maintenance;
- reuse/recycling; and
- fuel, energy, water, and natural and cultural resource conservation.

The P2 Program provides many services, including

- assessments of your operations and processes to help you to identify and implement source elimination/reduction projects;
- the annual P2 Project Call, which provides funding to you for source elimination/reduction projects;
- annual P2 metrics reporting on behalf of LANL as a whole, as required by federal and state regulations and permits; and
- ID and implementation of institutional P2 projects and projects on behalf of individual organizations.

P2 Sustainable Practices

Several techniques are available to prevent or minimize pollution before generation. Examples of sustainable practices are provided in the following table.

Technique	Description
Preplanning for Sustainable Consumption and Operations	• Identify all potential interactions with the environment. • Modify work practices and/or products to eliminate pollution at the source. • Limit resource consumption and source (waste, effluent, discharges) generation by planning, and implementing efficient operations. • Consider the lifecycle of procured items (how it will be used and reused, how it might interact with the environment, how it will be disposed at the end of its useful life). • Plan to reuse existing items rather than procure new items.
Substitution	• Replace hazardous materials/chemicals with nonhazardous or less-hazardous materials. • Replace disposable or one-time-use materials with reusable materials.
Reduction	• Minimize the amount of hazardous material that goes into a process to eliminate/reduce the volume and/or toxicity of the resulting process wastes. • Limit radiologic waste generation by taking only those materials, tools, and electronics necessary to complete work inside the controlled area.
Reuse	• Reuse materials, chemicals, and equipment. • Reuse byproducts of upstream processes as inputs to downstream processes.
Chemical Exchange	• Share unused/unspent chemicals, materials, and equipment with other LANL organizations through chemical share and swap shop programs.
Recycling	• Reclaim usable material and energy from wastes and byproducts. ***Note:*** *Prime candidates for recycling include elemental mercury, lead-acid and gel-cell batteries, unused laboratory chemicals, compressed gas cylinders, scrap metal, paper, corrugated cardboard, glycol, sludge, and solder waste.*

Note: *Contact the EPC-ES Group, your Deployed Environmental Professional, or your WMC for help with applying P2 waste minimization techniques or for identifying recyclable materials and wastes.*

What Are Opportunity Assessments?

Pollution Prevention Opportunity Assessments can be used to examine processes that produce waste and to find ways to reduce or eliminate waste streams. Solutions may include

- process changes,
- equipment modification,
- chemical substitutions,
- recycling, and
- inventory management.

P2 Performance Indicators

LANL is tracking key environmental indicators in an ongoing effort to assess performance against P2 goals. The following areas are monitored for progress:

Find additional information about LANL's EMS, P2, Sustainability, Recycling and Compliance programs on the Laboratory's home page by clicking Environment.

- sustainable acquisition (green purchasing) of products or services that have a comparatively smaller negative effect on human health and the environment;
- LLW reduction;
- TRU waste reduction;
- hazardous waste reduction;
- sanitary waste reduction;
- recycling rate increase for specific categories of waste (hazardous, sanitary, etc.);
- greenhouse gas emissions; and
- energy and water use.

P2 Projects Fund

Through the P2 Projects Fund, the P2 Program funds projects that reduce waste or prevent pollution. Projects are nominated annually, peer reviewed, evaluated, and funded by LANL's P2 Program Review Committee. The committee comprises representatives from the Environmental Protection division and other divisions across LANL. Information about the program and its deadlines is announced annually on the LANL homepage.

Annual P2 Awards

LANL reduces environment impacts.

Each year, as part of April's Earth Day activities, LANL presents P2 awards to individuals or teams who make efforts to minimize or eliminate workplace impacts on the environment. These awardees are then nominated for NNSA and DOE National Pollution Prevention awards.

In 1993, LANL maintained 141 National Pollutant Discharge Elimination System (NPDES) outfalls. LANL's Outfall Reduction Program (ORP) has since reduced the number of actively discharging NPDES-permitted outfalls at LANL to nine. It is anticipated that only four NPDES-permitted outfalls will remain after the next permit cycle; of those, only two will be actively discharging. The full realization of the ORP strategy anticipates the reclamation, reuse, and recycling of up to 500 acre-feet per year, or approximately 163 million gallons of potable groundwater annually. In fiscal-year 2012, the ORP won a LANL P2 Award and an NNSA National Best in Class Pollution Prevention award.

Module 3: RCRA Implementation Requirements

Module Overview

Large-quantity generators and their RCRA-permitted facilities must meet more stringent compliance requirements than generators of smaller quantities of waste. This module explains the different categories of generators and the many different areas in which they must comply with RCRA requirements.

Module Objectives

After completing this module, you will be able to recognize

- the compliance requirements for RCRA-permitted waste facilities (for example, large-quantity generators and TSFs); and
- the air emission, documentation, record-keeping, and permitting requirements for RCRA-permitted facilities.

LANL Generator Standards

A waste generator is any facility, owner, or operator whose act or process produces waste or first causes waste to become subject to the regulations.

Note: *As a whole, LANL is viewed as a single generator, or single-generation site, by external regulators.*

LANL Generator Requirements

Waste generators must meet specific requirements pertaining to

- ID,
- accumulation of waste,
- DOT pretransport handling regulations,
- empty container guidelines,
- the UHWM, and
- reporting.

Activity 2: Requirements for Generators

Fill in the blanks based on information provided by your instructor.

Identification

The generator must obtain an EPA _____ number from the EPA or an authorized state.

Accumulation of Waste

Large-quantity generators may accumulate waste for less than _____ days before transporting the waste to a TSF if

- waste is properly stored and marked,
- a contingency plan outlining emergency procedures is in place, and
- facility personnel are trained in the proper handling of hazardous waste.

If hazardous waste is accumulated for more than 90 days, large-quantity generators must comply with the requirements in Subtitle C of RCRA for TSFs.

DOT Pretransport Handling Regulations

The generator must comply with DOT pretransport handling regulations, which include

- proper packaging and closure to prevent leakage of hazardous waste during both normal transport conditions and potentially dangerous situations;
- proper _____, _____,and _____ of the packaged waste to identify the characteristics and dangers associated with transporting the waste; and
- affixing an "_____" label, which meets specific dimensions as prescribed in 49 CFR 172.450, to a packaging that previously contained radioactive material and that has been emptied of contents as far as practical.

Empty Container Guidelines

- Empty containers stored outside should be placed upside down, to prevent _____ of liquids and should be marked or labeled "Empty."
- Empty containers may be _____, _____ through SDSs or sent to _____.

Note: *Do not use the DOT "Empty" label for containers that once held nonradioactive waste.*

Reporting

Large-quantity generators that ship any hazardous waste offsite to a TSF must submit a _____ to the regional administrator by March 1 of every even-numbered year.

Note: *The correct answers are provided in the Answer Key at the end of this student manual.*

TSF Standards

Documentation Requirements

TSF personnel must follow the waste analysis plan, maintain waste-related plans and records, and submit certain reports to comply with the hazardous waste management requirements in 40 CFR Parts 264, 265, and 270, and the LANL Hazardous Waste Facility Permit issued by NMED.

The following documents are primary drivers for the internal records (such as characterization data, LDRs, waste quantities, inspection records, emergency response procedures, and general operating information) that must be furnished upon request to state and federal regulators:

- operating record requirements,
- waste analysis plan,
- inspection schedule, and
- contingency plan.

Operating Record Documentation

The operator of a TSF must keep a written operating record at the facility. Waste operations information must be recorded, as it becomes available, and maintained in the operating record until the facility is closed. Required information includes the following:

- a description and the quantity of each hazardous waste received, and the method(s) and date(s) of its treatment, storage, or disposal at the facility;
- the location of each hazardous waste within the facility and the quantity at each location;
- records the results of waste analysis and waste determinations performed;
- summary reports and details of all incidents that require implementing the contingency plan;

- records and results of inspections as required; and
- monitoring, testing, or analytical data.

Inspection Schedule

The TSF owner or operator must develop and follow a written schedule for inspecting all equipment that is important to preventing, detecting, or responding to environmental or human health hazards. The inspection schedule is documented as the Inspection Plan within the permit or permit application documentation.

The TSF owner or operator must

- keep the inspection schedule at the facility,
- identify on the inspection schedule the types of problems for which to look during inspections,
- remedy any deterioration or malfunction of equipment or structures, and
- record inspections in an inspection record.

Contingency Plan

The contingency plan is designed to minimize the hazards associated with

- fires,
- spills, or
- explosions.

Note: *A more detailed discussion of the contingency plan is provided in Module 6.*

Waste Analysis Plan

The waste analysis plan is located within the permit or the permit application and must be kept at the TSF. This plan specifies the following:

- the parameters for which each hazardous or nonhazardous waste stream will be analyzed;
- the methods of characterization (sampling analysis as AK) that will be used to test for these parameters;
- the sampling method;
- the frequency of analysis;

- for offsite facilities, the waste analyses that hazardous waste generators have agreed to supply; and
- where applicable, the methods that will be used to meet additional waste analysis requirements.

Uniform Hazardous Waste Manifest

The UHWM tracks waste from cradle to grave. The UHWM contains the following information:

- name and EPA ID number of the generator, transporters, and facility where waste is to be treated;
- DOT description of the waste being transported;
- quantities of the waste; and
- address of the TSDF where waste is destined.

The following table describes the UHWM tracking process.

Step	Action	
1	A final copy of the UHWM is sent back to the generator from the final destination point.	
2	**If . . .**	**then . . .**
	the generator does not receive a copy of the final UHWM within 35 days	the generator must attempt to locate the waste.
	the generator does not receive a copy of the final UHWM within 45 days from the date on which the initial transporter received the waste	the generator must file an exception report with the regional administrator of the EPA.

Land Disposal Restrictions

The LDRs, found in 40 CFR 268, impose stringent controls on the land disposal of hazardous wastes. For applicable wastes, the LDRs specify concentration- and/or treatment-based standards.

Note: *Specific documentation is required for LDR waste shipments. If you have questions regarding LDRs, contact your WMC.*

Air Emission Requirements

The air emission requirements were developed to limit organic air emissions at TSFs subject to RCRA permitting. The air emission requirements

- require reduction of total organic air emissions for process vents associated with specific operations (for example, distillation or solvent extraction) and
- mandate leak detection and repair standards for defined equipment (for example, valves, pumps, or compressors) at TSFs.

Note: *To meet regulatory requirements and the intent of the air emission requirements, DOT-approved waste containers that fully enclose the waste must be closed when not in use.*

Corrective Action Program

The corrective action program is implemented through the HSWA, which amended RCRA in 1984. The HSWA gave the EPA broad new corrective action authorities and introduced cleanup requirements based on groundwater protection standards for owners or operators of TSFs and stringent controls on the land disposal of hazardous waste.

In accordance with these provisions of HSWA, LANL's permit to operate hazardous waste treatment and storage units includes a section that prescribes a specific corrective action program for LANL, which focuses primarily on the investigation and cleanup (if required) of inactive sites.

Groundwater Protection Standards

A TSF owner or operator must take corrective action to ensure that regulated units are in compliance with the groundwater protection standards under 40 CFR 264.92 and 265.92. The owner or operator must

- implement a corrective action program that prevents hazardous constituents from exceeding concentration limits by removing the hazardous waste constituents or treating them in place,
- begin corrective action within a reasonable time after the groundwater protection standards are exceeded,
- establish and implement a groundwater monitoring program to demonstrate the effectiveness of the corrective action program,

- report in writing to NMED the effectiveness of the corrective action program, and
- submit an application within 90 days to NMED requesting a permit modification if the owner or operator feels that the corrective action program no longer satisfies the requirements stipulated in the regulations.

Record-Keeping Requirements

The following table lists the record-keeping requirements for the documents that must be completed by the generator at the TSF.

Record-Keeping Requirements	
Plans	
waste analysis plan	maintained at the TSF
inspection schedule (plan)	maintained at the TSF
contingency plan	maintained at the TSF and <90-day accumulation area
Records	
waste characterization data	• documented in the WCATS • may require supporting documentation • maintained at the facility for the life of the facility
LDRs	• determined from LANL LDR and underlying hazardous constituent information form • documented on the LDR notification form • maintained at the facility for the life of the facility
waste quantity information	• determined from the WDR form • documented on the UHWM, for quantities shipped offsite • tracked by the Environmental Stewardship Office (EPC-ES) • maintained at the TSF forever
inspection records	• documented on the Inspection Record Form (IRF) • original records must remain at the inspected facility forever
emergency response procedures	• Lab-wide procedures are documented in the EMP • TSF procedures are documented in the contingency plan • <90-day accumulation area procedures are documented in the emergency and site-specific plan and the contingency plan
operating record	• documented in the TSF operating record • maintained at the TSF

Reports	
exception report	Generator must keep a copy for at least 3 years from the due date of the report
biennial report	The LANL RCRA Compliance Group maintains copies forever

Activity 3: True or False?

Purpose

This activity will provide a brief review of a few concepts discussed in this module regarding generator and TSF standards.

Circle the correct answer (True or False).

1.	T F	The HSWA, which amended RCRA in 1984, introduced cleanup requirements and stringent controls on the land disposal of hazardous waste.
2.	T F	A corrective action program is not required for facilities seeking a permit to treat, store, or dispose of hazardous waste.
3.	T F	LDRs specify concentration- and treatment-based standards.
4.	T F	RCRA air emission requirements were developed to limit radionuclide emissions at TSFs.
5.	T F	The waste analysis plan, inspection schedule, and contingency plan must be furnished upon request to state and federal regulators.
6.	T F	The TSF owner or operator must keep the inspection schedule at the facility.
7.	T F	Generators must keep a copy of the exception report forever.
8.	T F	Characterization data must be maintained at the TSF forever.
9.	T F	P409 covers general waste management requirements.

Note: *The correct answers are provided in the Answer Key at the end of this student manual.*

Hazardous Waste Permit Program

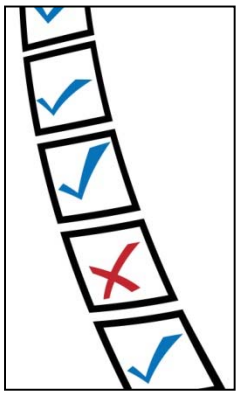
A permit is an authorization, license, or equivalent control document issued by the EPA or an authorized state to implement specific requirements in the hazardous waste regulations.

Types of Permits

The following table describes five types of permits.

Permit Type	Description
treatment, storage, and disposal (TSD)	Owners and operators of hazardous waste management units must have a TSD permit in place if waste is being treated, stored, or disposed of during the active life of the unit.
permit by rule	A provision of the hazardous waste regulations states that a facility or activity is deemed to have a RCRA permit if the facility or activity meets the requirements of the provision.
postclosure	Owners and operators of surface impoundments, landfills, land treatment units, and waste pile units that received waste after July 26, 1982, or that certified closure after January 26, 1983, must have a postclosure permit. The postclosure permit must address groundwater monitoring, unsaturated zone monitoring, corrective action, and postclosure care requirements.
research, development, and demonstration	A research, development, and demonstration permit is issued by the administrator or authorized state for any hazardous waste treatment facility that proposes to use an innovative and experimental hazardous waste treatment technology or process for which permit standards have not been promulgated.
remedial action plan	The remedial action plan is a special form of RCRA permit that a facility owner or operator may obtain to authorize the treatment, storage, or disposal of hazardous remediation waste at a remediation waste management site.

Purpose



A RCRA hazardous waste permit will describe the administrative and technical standards for TSFs and provide the EPA and authorized state with an enforcement mechanism.

Facilities

The following facilities must have a permit:

- all hazardous waste TSFs,
- new units to be constructed, and
- existing facilities in interim status.

Permit Application

Part A

Part A of the permit application is a short, standard form that includes

- general information about the facility;
- a description of the activities conducted at LANL;
- a description, including quantities, of hazardous wastes;
- a description of treatment, storage, and/or disposal methods; and
- a listing of all permits or construction approvals received or applied for under other environmental programs.

Part B

Part B of the permit application, which follows no standard format, includes

- a general description of the facility,
- the facility location information,
- a description of operations at the facility,
- training programs,
- a waste analysis plan,
- an inspection schedule,
- a contingency plan,
- a description of the security procedures and equipment,
- closure and postclosure plans,
- closure and postclosure cost estimates, and
- land disposal information.

Note: *Facilities in interim status must comply with the requirements governing the submission of a Part A application and the interim status standards in 40 CFR 265.*

Permit Modification

It is important to consider the potential impact to LANL's Hazardous Waste Facility Permit when process, procedure, or design changes associated with RCRA-permitted facilities occur. This section will familiarize you with the types of activities that require a formal permit modification request to NMED for approval.

The permit modification request process involves the following steps:

- LANL prepares a permit modification request;
- NMED then
  - reviews the request,
  - determines the appropriate class of modification,
  - issues public notice of the modification, and
  - approves the modification.

The reasons for modifying a permit include

- alterations to the permitted facility,
- newly obtained information, or
- new laws and regulations.

Classes of Permit Modifications

The following table describes the three classes of permit modifications.

A permit modification known as . . .	is used for . . .
Class 1	routine changes.
Class 2	common or frequent changes to the operations.
Class 3	major changes that substantially change the facility or the operation of the facility.

Examples of Permit Modifications

The following table provides examples of LANL activities that required permit modifications.

A permit modification of . . .	was required for . . .
Class 1	updates reflecting organizational structure changes.
Class 1	changes in personnel responding to emergency calls as per the original contingency plan.
Class 1	a request to remove never-built units from the permit.
Class 2	removal of emergency equipment from contingency plan.
Class 3	the addition of interim status treatment units at TA-36 and TA-39 to the permit.

Module 4: Waste Storage Areas

Module Overview

This module presents an overview of waste storage area requirements. It provides specific requirements associated with labeling, performing inspections, volume and time limitations, and signs/postings. Consequences of noncompliance with storage area requirements are listed, and guidance for managing empty containers is also included in this module.

Module Objectives

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

- the requirements and limitations of several types of waste storage areas,
- container and labeling requirements,
- past waste storage compliance violations observed at LANL and the potential consequences of noncompliance, and
- requirements for the classification and management of empty containers.

Radioactive waste drums.

Satellite accumulation area.

TRU waste storage area.

Storage Area Requirements and Limitations

The following types of accumulation areas must be registered with the LANL RCRA Compliance Group:

PCB large mark (M_L).

- satellite accumulation area (SAA),
- <90-day accumulation area,
- universal waste area,
- New Mexico special waste area,
- used oil area, and
- PCB area.

LANL wastes are generally stored in temporary waste accumulation areas before being transported to a receiving facility for treatment, long-term storage, and/or disposal. Each of the temporary waste accumulation areas has storage requirements that are driven by federal and state regulations that address

- volume limits,
- labeling,
- time constraints,
- location,
- inspections, and
- signs/postings.

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

Satellite accumulation area.

Temporary Waste Accumulation Areas

After waste has been properly characterized and generated, it is stored in a temporary accumulation area. Hazardous and radioactive wastes generated at LANL are typically stored in temporary waste accumulation areas before the waste is moved to another location for treatment, storage, or disposal. The following table describes the types of temporary waste accumulation areas at LANL.

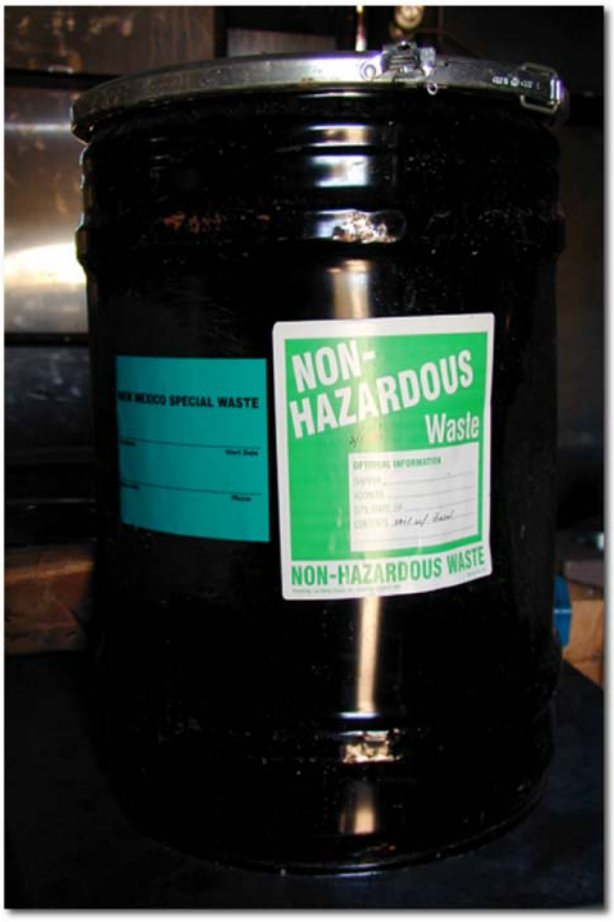
Types of Temporary Waste Accumulation Areas[a]	Description
Satellite Accumulation Area (SAA)	An accumulation area for hazardous or mixed waste, under the control of the generator, and located to serve a process, room, or suite of rooms where waste is generated.
<90-day Accumulation Area	An accumulation area where hazardous or mixed waste may be stored for up to 90 days without a permit; that is, no given hazardous or mixed waste may remain at such a storage area for more than 90 days.
Universal Waste Area	An area that is dedicated to specific hazardous waste types that are subject to universal waste requirements includes certain types of batteries, pesticides, thermostats, lamps, and aerosol cans.
Used Oil Area	An area dedicated for the temporary storage of used oil intended for recycle. Used oil, as defined by the EPA in 40 CFR 279.1 is “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.”
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 Staging Area	LLW may be staged for no more than 90 days pending transport to a LLW storage area or TSF. LLW can be staged to accumulate the waste to facilitate transportation, treatment, and/or disposal. The staging fill date begins when the container for the waste has been filled and sealed, as long as this is done in a timely manner. The staging fill date must then be included on the container.
Radioactive Waste Storage Area	If the waste is staged for longer than 90 days, it becomes subject to storage requirements. Waste packages cannot be stored for longer than 1 year. If storage must exceed this limit, the facility must resubmit its radioactive waste management basis and request a storage extension by following the process outlined in P930-2, *Waste Certification Program*, Section 3.3.

[a]Temporary Accumulation Areas include SAA, <90-day, universal, and NM special waste storage areas.

Setting Up a Temporary Accumulation Area

Before setting up a temporary accumulation area, you must

- review the site
  - check the area for possible ignition sources,
  - ensure that egress is not blocked, and
  - ensure that the area is free of obstacles or deterioration;
- identify authorized users;
- register the accumulation area by completing the online form in the storage area tracking system database;
- post the required signage for that particular accumulation area; and
- for storage of radioactive or mixed wastes, contact the radiological control technician (RCT) in your area.



New Mexico special waste storage area.

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.

Secondary containment should be provided for liquid wastes as needed.

Secondary containment storage area.

Specific Requirements

The following tables outline the specific requirements for temporary waste accumulation areas.

	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 or have log book	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 LANL RCRA Compliance Group	• Must have a minimum of 2-ft aisle spacing • Must have an emergency/ site-specific plan and a contingency plan • Must have emergency and decontamin-ation equipment available • Must be registered with the LANL RCRA Compliance Group	Must be set up in an approved storage location that is registered with the LANL RCRA Compliance Group	• Must be set up in an approved storage area that is registered with the LANL RCRA Compliance Group • Waste must not be disposed of in a solid-waste dumpster

	Satellite Accumulation Area	<90-Day Accumulation Area	Universal Waste Area	NM Special Waste Storage Area
Inspections	Formal inspections (using the IRF) are not required	Weekly or Daily, if waste is actively managed	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
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 LANL RCRA Compliance Group	For PCBs >50 parts per million, 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*

Leaks and Spills

Leaks and spills of radioactive, hazardous, or mixed waste must be cleaned up immediately, and the cleanup material must be managed as a hazardous or mixed waste. Generators and WMCs must follow established emergency response actions as defined by the facilities where work is conducted.

If a hazardous waste leak or spill occurs and no established emergency spill actions are defined, you should

- contact your supervisor and
- do one of the following:
  - call 911,
  - contact the Emergency Management group (EO-EM) at 7-6211, or
  - follow your facility emergency procedures.

If a mixed-waste spill occurs, contact an RP-1 RCT.

Chemical Compatibility

If multiple waste streams are stored at temporary waste accumulation areas and/or TSFs, the waste containers must be compatible with the waste and segregated from incompatible waste streams. An *incompatible waste stream* is defined as a hazardous waste that is unsuitable for

- placement in a particular device or facility because it may cause corrosion or decay of containment materials (e.g., container inner liners or tank walls) or
- commingling with another waste or material under uncontrolled conditions because of possible adverse effects resulting from commingling.

Use the compatibility tool, ADESH-AP-115, to understand waste compatibility and potential incompatibilities.

Lessons Learned

SDSs May Not Contain Adequate Information to Safely Consolidate Similar, but Not Identical, Chemical Mixtures

When similar, but not identical, chemical mixtures are consolidated in a single container, especially commercial mixtures, care should be taken to plan the work thoroughly and to have personnel familiar with chemical compatibility review the product SDSs and obtain additional information. The potential for incompatibility is often not adequately indicated in the SDSs, and reactions that generate toxic gas may occur.

During the consolidation of about 20 gallons of unused polyelectrolytes into a 55-gallon drum, one of the technologists noticed a hydrogen sulfide gas odor. The operation was stopped, and the fire department was notified. Subsequently, the mixture was neutralized by workers wearing self-contained breathing apparatuses, and the reaction, including gas generation, was halted.

The materials were consolidated based on information from SDSs, which indicated only that the materials would react with mineral acids and strong oxidizing agents. The SDSs lacked the pH and compositional information necessary for safe consolidation.

Recommended Actions

- Blending of similar, but not identical, materials should be done only after incompatibility issues have been thoroughly resolved.
- Use caution when blending commercial mixtures, as all ingredients are rarely divulged because of the proprietary nature of these materials and “inert” ingredients are often not chemically inert.
- The pH of aqueous mixtures should be determined to prevent the unwanted formation of toxic gases (H_2S, HCN) by the reaction of acids with sulfides or cyanides.

~Lawrence Livermore National Laboratory, March 19, 1997

Waste Container and Labeling Requirements

Labeling Requirements

Containers holding waste must meet the labeling requirements as indicated in federal and state regulations and internal policy documents. In general, labels must

- be legible and not faded;
- be placed on the container that fully encloses the waste;
- include the accumulation start date, when required;
- include the words **Hazardous Waste,** even if the waste is pending analysis; and
- include both **Radioactive** and **Hazardous Waste** labels if the container holds mixed waste.

Permitted TSFs require a “free liquids” label on containers that contain any liquids at all.

Classifying and Managing Empty Containers

EPA Requirements

According to RCRA, a container once holding RCRA-regulated waste, with the exception of P-listed waste, is considered empty if it is emptied by a method commonly used for that type of container. Container and residual wastes are *not* classified as hazardous if as much material as possible has been emptied and

- no more than 1 inch of material remains in the bottom of the container, or
- <3% of material remains in a container that has a capacity <119 gallons, or
- <0.3% of material remains in a container that has a capacity >119 gallons.

For acutely hazardous waste (P-listed waste) and specific F-listed wastes (F020, F021, F022, F023, F026, and 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. **However, LANL does *not* recommend triple rinsing containers once holding acutely hazardous waste to render it empty because it increases the amount of waste (RCRA mixture rule).**

DOT Requirements

According to DOT regulations, a packaging that previously contained radioactive material and that has been emptied of contents as far as practical *must* be affixed with an “Empty” label that meets specific dimensions as prescribed in 49 CFR 172.450.

LANL Guidelines

Follow these guidelines for the management of empty containers:

- Empty containers stored outside should be placed upside down to prevent the accumulation of liquids and should be marked or labeled “Empty.”
- Empty containers may be reused, recycled, or sent to salvage via salvage@lanl.gov .

Note: *Use the DOT “Empty” label for containers that once held radioactive waste.*

Module 5: Inspections

Module Overview

RCRA-permitted facilities are regulated by state and federal agencies to have in place a waste management inspection plan. In this module, you will learn about the authorities of both internal and external inspectors. Also included in this module is an explanation of the IRF and instructions on completing this form for LANL-generated waste.

Module Objectives

After completing this module, you will be able to

- recognize the authorities of internal and external inspectors and
- complete the IRF in accordance with LANL RCRA Compliance Group instructions.

RCRA Inspections

State and federal regulators require LANL to develop an inspection plan. This plan is an attachment to the Hazardous Waste Facility Permit and must be implemented across LANL.

Waste management inspections help ensure compliance with RCRA regulations. Internal personnel and external regulatory and nonregulatory agencies conduct inspections of waste accumulation areas and TSFs located throughout LANL.

Inspections by External Regulatory and Nonregulatory Agencies

The primary target of audit review by external agencies is LANL's record of internal inspections of hazardous waste accumulation and storage areas.

The following table describes the inspections conducted by external regulatory and nonregulatory agencies.

External Agencies	Inspections	Authority
Regulatory		
• NMED • EPA	• have the right to inspect at any given time • are not required to provide prior notification • inspect LANL files • provide written NOVs • issue compliance orders	have full authority to levy fines and civil and criminal charges
Nonregulatory		
DOE	• announces plans for inspections • provides advance notice to LANL staff • provides a written report of findings, vulnerabilities, or deficiencies	• cannot levy fines for hazardous/mixed waste violations • as owner of LANL, has the right to shut down LANL operations

Note: *NMED has the right to inspect all areas; denial of access is warranted only for safety or security reasons.*

Inspections by Internal Organizations

Designated Facility Inspectors

The following individuals may conduct required RCRA inspections:

- generators,
- WMCs,
- team/group leaders, and
- trained TSF workers.

Inspection Areas

RCRA inspections must be performed at

- permitted TSFs and
- <90-day accumulation areas.

Note: *Inspections of SAAs, universal waste areas, and New Mexico special waste storage areas are not required; however, the LANL RCRA Compliance Group and state inspectors will perform inspections of these areas.*

Frequency of Internal Inspections

Internal inspections of TSFs and <90-day accumulation areas must be performed

- weekly or
- daily (or on the day after for TSFs), if waste is actively managed in the area on that day (adding, removing, or treating waste);
- and daily inspections are required for some waste areas at LANL.

Checking waste processing containers.

Consequences of Noncompliance

TSF and <90-day accumulation area workers must comply with LANL policies and procedures when performing waste management duties at LANL. Complying with LANL policies and procedures ensures that state and federal requirements will be met.

Your Responsibilities

You are responsible for complying with ESH regulations. Failure to comply with federal and state regulations, internal policies and procedures, and LANL's Hazardous Waste Facility Permit can lead to serious consequences. Noncompliance may result in penalties assessed to LANL and to individuals within LANL. The following table describes the possible 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 and penalties up to – $27,500 per day per violation or – $50,000 per day per violation for chronic violations and • can include – loss of permits required to operate or – shutdown of operations. ***Note:*** *Fines may be retroactive.*
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 per 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.

Human Performance Improvement

Encouragement and Reinforcement

Human performance improvement (HPI) is an approach used to address human error in the workplace. HPI treats human error as a symptom or result of deeper problems within a system. One of the five basic principles of HPI is that people achieve high levels of performance based largely on the encouragement and reinforcement received from peers, leaders, and subordinates.

People naturally want to succeed, but people are fallible, and even the best make mistakes. A leader can help to reduce the severity of consequence of the inevitable mistakes by creating an error-tolerant work environment where

- written and unwritten values encourage the fixing of organizational and systemic problems that lead to errors,
- individuals feel safe in observing and reporting their errors, and
- nonconsequential errors and near misses are acted on (without malice) to build or fortify defenses and so reduce the risk and/or consequence of such errors in the future.

Creating such a work environment helps to foster a culture that values prevention rather than reaction. One technique to foster such a culture is to recognize individuals who have successfully implemented and/or met environmental requirements. LANL P2 awards are a good example of recognizing individual and team efforts.

For more information about HPI, register for *HPI–Human Performance Improvement* (COURSE 43428) by accessing the Training link on the LANL home page.

Inspection Record Form

Purpose

The IRF is a LANL form that is reviewed by external inspectors/auditors and used for documenting RCRA inspections. The IRF provides

- a checklist for items to be inspected,
- documentation of problems to allow for immediate resolution,
- official documentation of the inspection process, and
- notation of corrective action taken.

Note: *Any deterioration or malfunction in a waste area that could lead to an environmental or human health hazard must be mitigated within 24 hours.*

Processing Requirements

The IRF is required to be kept forever. The original need not be the record; electronic copies may serve as the record.

The inspector must

- use one form per week for both daily and weekly inspections;
- keep the original IRF forever; and
- keep records orderly.

Part I Instructions

The following table provides instructions for completing Part I of the IRF.

You should . . .	for . . .
write NA (not applicable)	• items not present in the inspection area at the time of inspection and • items not inspected on a given day because the site was not in operation.
write OK	all items inspected on a given day for which no deficiencies were noted.
write AR (action required)	• all items inspected on a given day for which a deficiency was noted and • each subsequent inspection date until the deficiency has been corrected.

Note: *When you identify an AR, make every effort to resolve the deficiency on the day of inspection or before waste is managed in the area.*

Part II Instructions

Documenting ARs

In Part II of the IRF, you must clarify all ARs noted in Part I by providing the following information:

- AR identifier (usually an assigned number for tracking),
- date,
- time,
- description of the deficiency,
- description of action taken to correct the deficiency, and
- inspector initials.

You must ensure that all boxes are completed.

Sample Documentation of ARs

(Field 19)	AR-1	6/9/03	2:30 p.m.
Hazardous Waste label missing from drum in the flammable area. Label was placed on drum immediately. JB			
(Field 16)	AR-2	6/10/03	10:30 p.m.
Evidence of leak or spill on asphalt at loading dock; appears to have soaked into asphalt. Work order sent to Maintenance and Site Services (MSS) for removal of contaminated asphalt (see attached copy). JB			
	AR-2	6/11/03	1:00 p.m.
Contaminated asphalt not yet removed. MSS says they will be here on Thursday (6/12/03) to remove it. JB			
	AR-2	6/12/03	2:00 p.m.
MSS replaced and evacuated contaminated asphalt at loading dock. JB			

Supporting Documentation

Types of supporting documentation could include

- phone logs,
- work orders,
- small-job tickets, and
- memos and letters.

Note: *RCRA regulations require all deficiencies found in the inspection process and all resulting corrective actions to be documented accurately on the IRF.*

Activity 4: Documentation of the Inspection Process

Purpose and Instructions

This activity will familiarize you with the inspection process and allow you to complete the appropriate IRF. Complete the IRF based on the following scenarios.

Treatment, Storage, and Disposal Facilities

1.	Waste is currently being stored in your TSF; however, no waste activity has occurred for more than 6 months. How would you complete field 7 for the entire inspection week?
2.	Waste is not currently being stored in your area. Indicate how you would complete field 6 for the entire inspection week.
3.	You are not operational on weekends. You have inspected your communications equipment daily and found no problems. How would you complete field 8 for the entire week?
4.	You are not operational on weekends. You found a label problem on Monday that was corrected immediately. How would you complete field 19?
5.	You are not operational on weekends. You must inspect your unloading area daily. On Tuesday you found a spill on a slab of asphalt and contacted MSS to correct the problem. MSS did not fix the problem until after close of business Wednesday night. How would you complete field 16 for the week?
6.	You inspect your secondary containment unit on Friday and notice standing water. How would you complete field 15? Would you inspect Saturday?
7.	During a daily inspection of a TSF, you notice less than 1 foot of aisle spacing between two rows of 55-gallon drums filled with waste. How would you complete field 22?

Note: *The correct answers are provided in the Answer Key at the back of this student manual.*

Inspection Record Form for <90-Day Accumulation Areas and TSFs

The following pages contain copies of the current IRF and instructions for <90-day accumulation areas (June 2011) and TSFs (November 2010).

HAZARDOUS/MIXED WASTE FACILITY INSPECTION RECORD FORM FOR < 90

[1] FACILITY: TA Bldg Room Other Location:	[2] Site ID #:	[3] START DATE:	[4] END DATE:

PART I- Enter condition of the item inspected **(OK**, **NA** [Not Applicable], or **AR** [Action Required]**)** in column for day inspected.

ITEM	INSPECTED FOR:	MON	TUE	WED	THU	FRI	SAT	SUN
[5] NO USE	No waste stored							
[6] LABELS	Proper labels on all tanks and containers							
[7] ACCUMULATION START DATE	Present and legible							
[8] NOT EXCEEDING 90 DAYS	Waste has not exceeded 90 days							
[9] COVERS/LIDS OF CONTAINERS	Closed and secured properly							
[10] INTEGRITY (containers/structure)	Integrity, leakage, deterioration, corrosion, and damage							
[11] COMPATIBILITY	Separated according to compatibility							
[12] AISLE SPACE/STACKING	Appropriateness and adequacy							
[13] COMMUNICATION EQUIPMENT	Availability and proper operating condition							
[14] SPILL/FIRE EQUIPMENT	Present, appropriate, and in proper operating condition							
[15] EYEWASHES/SAFETY SHOWERS	Proper operating condition							
[16] TANK SYSTEMS (Aboveground portions)	Discharge controls, leakage, fill level, and corrosion							
[17]**DATE**								
[18]**TIME**								
[19] **NAME OF INSPECTOR(S)**								

Comments:

June 2011

HAZARDOUS/MIXED WASTE FACILITY INSPECTION RECORD FORM FOR < 90

[1] FACILITY: TA Bldg Other Location:	[2] Site ID #:	[3] START DATE:	[4] END DATE:

Part II- For any AR (Action Required) in PART I, describe below: action required, action taken, date, and time of action. Attach additional sheets if necessary. If more than one action is required, number each AR.

[20]

June 2011

HAZARDOUS WASTE FACILITY INSPECTION RECORD FORM

[1] FACILITY:	[2] Site ID #:	TREATMENT, STORAGE, OR DISPOSAL UNIT (TSD)	[3] START DATE:	[4] END DATE:

[5] Containers Landfill Chemical Treatment Tank Miscellaneous Unit (OB/OD, Cementation)

PART I- Enter condition of the item inspected **(***i.e.* **OK**, **NA** [Not Applicable], or **AR** [Action Required]**)** in column for day inspected.

ITEM	**INSPECTED FOR:**	**MON**	**TUE**	**WED**	**THU**	**FRI**	**SAT**	**SUN**
[6] NO UNIT USE	No waste stored							
[7] NO WASTE HANDLING	No waste handled (see instructions)							
All TSDs								
[8] COMMUNICATIONS EQUIPMENT	Availability and proper operating condition							
[9] WARNING SIGNS	Posted, legible, and bilingual							
[10] SECURITY	Good condition of fences, gates, locks, and other access control equipment							
[11] WORK SURFACES/ FLOORS/ROADS	Absence of conditions that could lead to an accident or spill							
[12] SPILL/FIRE EQUIPMENT	Present, appropriate, and in proper operating condition							
[13] EYEWASHES/ SAFETY SHOWERS	Proper operating condition							
[14] WIND SOCK	Proper operating condition and functional							
[15] SECONDARY CONTAINMENT	Integrity- No standing water/waste, erosion, or signs of a spill							
[16](UN)LOADING AREA	No spills or deterioration							

1 of 2

[17] RUN-ON/OFF CONTROL	Integrity- no ponding, erosion, or damage							
Container Storage Units and/or Tanks (see instructions)								
[18] COVERS/LIDS OF CONTAINERS	Closed and secured properly							
[19] LABELS	Proper with start date, present & legible							
[20] COMPATIBILITY	Separated according to compatibility							
[21] INTEGRITY	No leakage, corrosion, or damage							
[22] AISLE SPACE/STACKING	Appropriateness and adequacy							

FACILITY:	Site ID #:	START DATE:	END DATE:

ITEM	INSPECTED FOR:	MON	TUE	WED	THU	FRI	SAT	SUN
[23]PALLETS AND RAISED CONTAINERS	Absence of conditions that could result in failure							
[24]TANK SYSTEMS	Discharge controls and fill level and no corrosion or leakage							
Other TSDs								
[25]SHAFTS/LANDFILL COVERS	Presence and condition of cover							
[26]OPEN BURNING UNITS	Condition of cover, and no erosion, leakage, or damage							
[27]OPEN DETONATION UNITS	Unit and vegetation condition and no erosion							
[28]CEMENTATION UNITS	Structural integrity and condition of equipment and systems							

	MON	TUE	WED	THU	FRI	SAT	SUN
[29] **DATE**							
[30] **TIME**							
[31] **INSPECTOR(S)**							

Part II- For any AR (Action Required) in PART I, describe below: action required, action taken, status, date, and time of action. Attach additional sheets if necessary. If more than one action is required, number each AR.

32

Part III- Comments.

33

Notes . . .

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Module 6: Emergency Response

Module Overview

RCRA requires workers to be trained to respond effectively to emergencies, and the training must familiarize workers with emergency equipment, procedures, and systems. This module provides an overview of emergency preparedness and planning that affect TSF and <90-day accumulation area workers.

Module Objectives

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

- the purpose of and major elements in the emergency management plan (EMP) and the contingency plan and
- the elements that must be included in an emergency and site-specific plan and the emergency/communication equipment required at <90-day accumulation areas and TSFs.

Trained emergency responders.

Note: *Do not attempt to mitigate an emergency if you have not received the proper training required under the Occupational Safety and Health Act and applicable LANL requirements (e.g., LANL Program Description PD1200-1, Emergency Management).*

Emergency Plan

EO-EM coordinates and manages the response to emergencies at LANL. The team consists of emergency managers, the communications technology team, the aviation operations specialist, the coordinator, the database administrator, the hazardous device team, the security emergency preparedness leader, the fire management officer, and required administrative support.

Elements of the Emergency Plan

LANL's Emergency Plan, emergency planning implementing procedures, and institutional documents establish an EM program that

- assigns responsibilities,
- guides the categorization and classification of an emergency,
- states necessary notifications for emergency-response personnel and the public,
- outlines the assessment of LANL and offsite hazardous materials conditions during and/or following an emergency,
- outlines an effective course of action to protect the public and LANL personnel in the event of an emergency,
- addresses an effective course of action to protect the public and LANL personnel in the event of an emergency,
- addresses the implementation of protective actions,
- guides mitigation of the hazardous materials consequences,
- outlines the necessary training for emergency-response personnel,
- supports LANL's core mission,
- provides a comprehensive emergency exercise program plan,
- provides an evacuation plan for LANL,
- provides a shelter-in-place standard for LANL, and
- provides guidance on protective equipment.

Note: *LANL Program Description PD1200-1 describes the LANL EMP.*

Contingency Plan

Federal and state regulations require each owner/operator of RCRA-permitted facilities, interim-status facilities, and <90-day accumulation areas in operation to be covered by a contingency plan in case of emergency. The LANL contingency plan is designed to minimize hazards to human health and the environment from

- fires;
- explosions;
- unplanned sudden or nonsudden releases;
- spills; and
- exposure to hazardous or mixed waste.

Note: *If uncontrolled, an unplanned, nonsudden release may impact the environment over a long period of time.*

LANL policy requires the contingency plan to be physically located at the TSF and <90-day accumulation area.

Elements of the Contingency Plan

The contingency plan outlines the emergency response resources and responsibilities for <90-day accumulation area and TSF workers. The following table provides internal and external response resources.

Response Resources	Responsibility
Hazardous Materials Team (Emergency Response group	• Chemical incidents • Radiological incidents • Hazardous and mixed waste incidents • Decontamination of responders • Response equipment • Chemical emergencies
Centerra Los Alamos	Chemical emergencies
Emergency Management and Response Team Office	Emergency manager becomes the incident commander
Occupational Health group	Emergency medical treatment
Los Alamos Fire Department	Dispatches firefighting personnel, equipment, and Emergency Medical Services
Los Alamos Police Department	Provides traffic control on public access roads
Los Alamos Medical Center	• Provides medical services • Provides and maintains emergency room

Response Resources	Responsibility
Waste Disposition Project	Provides guidance on proper treatment, storage, and offsite shipment of hazardous and mixed waste
Health Physics personnel	• Provide routine guidance on radiological decontamination • Provide routine site evaluation and monitoring to determine the nature and extent of radiological contamination
Industrial Hygiene and Safety personnel	• Provide guidance on industrial hygiene equipment and on operational safety • Provide routine site evaluation/support field testing to determine the nature and extent of chemical contamination
Contractor Assurance Office	Reports occurrences and tracks follow-up actions
Meteorology and Air Quality personnel	Provide information on meteorological conditions
Water Quality personnel	Provide information on hydrologic conditions
Hazardous Waste Compliance personnel	• Provide guidance on regulatory requirements • Conduct field surveys to determine spread of contamination and adequacy of cleanup
Ecology personnel	Provide information on biotic conditions
TA-55 Operations division	• Provides initial emergency site evaluations at TA-55 and conducts activities related to the prevention, notification, and control of emergencies at TA-55 • In the event of an emergency, monitors for leaks, pressure buildup, gas generation, or equipment ruptures, if necessary • Maintains and operates TA-55 Emergency Response Team
High-Explosives Area Access Control	Provides information and/or assistance during emergencies involving units at TA-16
Dynamic and Energetic Materials division	Provides information and/or assistance during emergencies involving units at TA-14, TA-36, and TA-39
Maintenance and Site Services (MSS)	• Dispatches maintenance personnel and equipment • Assists in waste cleanup under direction of the recovery manager

The contingency plan also contains the following information:

- procedures for responding to various types of emergencies;
- emergency coordinator information, including a current list of emergency coordinators and their current telephone numbers;
- a list of emergency equipment (the emergency equipment must be operable); and
- an evacuation plan, if evacuation is warranted.

Emergency and Site-Specific Plan (<90-Day Only)

In addition to the contingency plan, LANL policy requires that a site-specific emergency plan be maintained at or near the <90-day accumulation area. This plan identifies

- primary and alternate emergency contacts,
- emergency equipment and location,
- spill control equipment and location,
- communication devices and location,
- decontamination equipment and location, and
- evacuation procedures.

Emergency/Communication Equipment

TSFs and <90-day accumulation areas must have emergency response equipment and emergency plans in place. The emergency response equipment includes

- spill-control equipment,
- fire-control equipment (as appropriate),
- emergency telephone and alarm, and
- eye-wash and safety shower (as appropriate).

It is imperative that emergency response equipment be operable. If the equipment is not operable, a violation and penalty will result.



Emergency response equipment is required—and must be operable—at TSFs and <90-day accumulation areas.

Salvage and Cleanup

Line managers work closely with emergency response personnel to

- manage recoverable waste properly,
- perform visual inspections,
- initiate appropriate sampling and analysis surveys, and
- initiate decontamination of damaged buildings as needed.

Post-Emergency Assessment

After an emergency, it is critical that a post-emergency assessment be completed. The cause of the emergency must be identified and the effectiveness of the response evaluated. Once the assessment is complete, corrective measures can be implemented to eliminate or mitigate a recurrence of a similar emergency.

After the devastation of the Cerro Grande wildfire in 2000, few people expected a second major wildfire. But personnel responsible for protecting stored radioactive waste at LANL continued to prepare for the possibility of fire. Over the next decade, LANL personnel prepared for a similar emergency, including extensive fire mitigation work. In addition, LANL reduced the amount of waste stored in Area G.

From late June through July of 2011, the Las Conchas wildfire burned more than 156,000 acres near LANL property and the surrounding region. The wildfire burned an area three times larger than the scorched acreage of the Cerro Grande fire in 2000. As a result of previous mitigation work, Area G was not endangered by the Las Conchas wildfire.

Most of Area G is paved, and ground fuels (such as vegetation and small trees) have been removed in a buffer zone around the facility to stop or slow encroaching fire.

Notes. . .

Answer Key

Activity 2 (p. 40): Requirements for Generators

Identification

The generator must obtain an EPA **identification** (ID) number from the EPA or an authorized state.

Accumulation of Waste

Large-quantity generators may accumulate waste for less than **90** days, before transporting the waste to a TSF, if

- waste is properly stored and marked,
- a contingency plan outlining emergency procedures is in place, and
- facility personnel are trained in the proper handling of hazardous waste.

If hazardous waste is accumulated for more than 90 days, large-quantity generators must comply with the requirements in Subtitle C of RCRA for TSFs.

DOT Pretransport Handling Regulations

The generator must comply with DOT pretransport handling regulations, which include

- proper packaging to prevent leakage of hazardous waste during both normal transport conditions and potentially dangerous situations;
- proper **marking** , **placarding** , and **labeling** of the packaged waste to identify the characteristics and dangers associated with transporting the waste; and
- affixing an "**Empty**" label, which meets specific dimensions as prescribed in 49 CFR 172.450, to a packaging that previously contained radioactive material and that has been emptied of contents as far as practical.

Empty Container Guidelines

- Empty containers stored outside should be placed upside down to prevent the **accumulation** of liquids and should be marked or labeled "Empty."
- Empty containers may be **reused, recycled** through the Waste Services group, or sent to **salvage**.

Uniform Hazardous Waste Manifest

The purpose of the UHWM is to track waste from **cradle** to **grave**. The UHWM contains the following information:

- name and EPA number of the generator, transporters, and facility where waste is to be treated;
- DOT description of the waste being transported;
- quantities of the waste; and
- address of the TSF where waste is destined.

The following table describes the UHWM tracking process.

Step	Action	
1	A final copy of the UHWM is sent back to the generator from the final destination point.	
2	**If . . .**	**then . . .**
	the generator does not receive a copy of the final UHWM within 35 days,	the generator must attempt to locate the waste.
	the generator does not receive a copy of the final UHWM within 45 days from the date on which the initial transporter received the waste,	the generator must file an exception report with the regional administrator of the EPA.

Reporting

Large-quantity generators that ship any hazardous waste offsite to a TSF must submit a **biennial report** to the regional administrator by March 1 of every even-numbered year.

Activity 3 (p. 46): True or False?

1.	True
2.	False
3.	True
4.	False
5.	True
6.	True
7.	True
8.	True
9.	True

Activity 4 (p. 69): Documentation of the Inspection Process

Treatment, Storage, and Disposal Facilities

1. Write *OK* or make a checkmark in field 7 for each weekday and write *NA* for Saturday and Sunday.
2. Write *NA* in field 7 for each day of the week (including Saturday and Sunday).
3. Write *OK* or make a checkmark in field 8 for each weekday and write *NA* for Saturday and Sunday.
4. Write *AR-1* in field 18 for Monday.
5. Write *OK* or make a checkmark in field 22 for Monday, write *AR-2* for Tuesday and Wednesday, write *OK* or make a checkmark for Thursday and Friday, and write *NA* for Saturday and Sunday.
6. Write *AR-3* in field 15 for Friday.

   No, not if the deficiency is corrected immediately.
7. Write *AR-3* in field 23 on the day of the inspection.

<90-Day Accumulation Areas

8. Yes.
9. Write *AR-1* in field 13 of the IRF for <90-day accumulation areas for Wednesday.

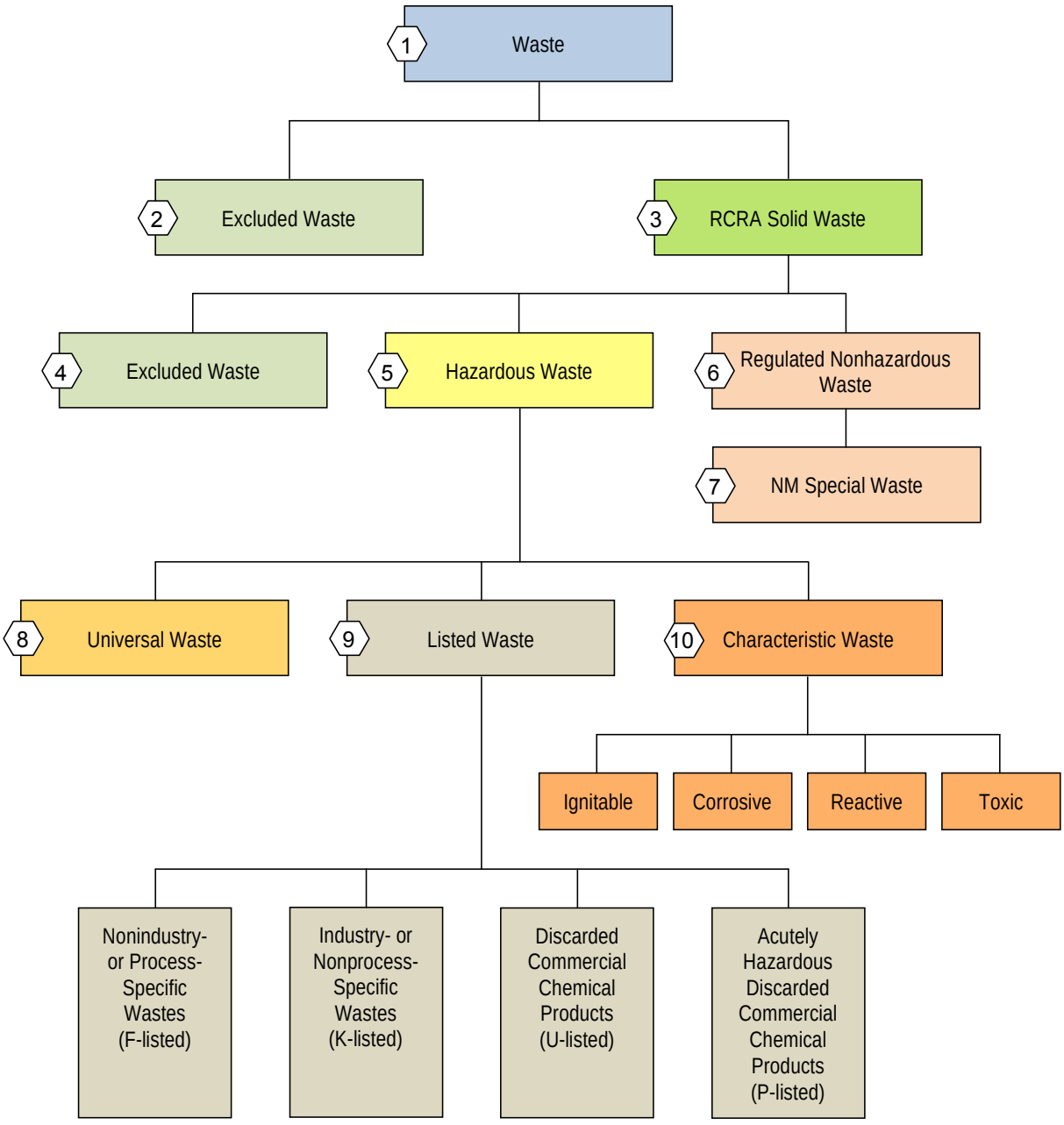
Note: *All ARs must be documented in Part II of the IRF. In addition, a detailed explanation of the corrective actions taken to mitigate the deficiency must be documented in Part II or attached to the IRF.*

Notes . . .

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 percent alcohol by volume and has flash point less 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 which, 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 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. 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 is the basis for listing the classes or types of listed wastes.

Table 2: Listed Wastes

EPA List	Definition
F-Listed[1] (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[1] (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[2] (see Table 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[2] (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)

[1] F and K codes can be used only if the source of the waste is known.
[2] 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. 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 ten percent 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 ten percent 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 ten percent 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 ten percent 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 ten percent 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 prior to shipment to a landfill for disposal and are either: disposed 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 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 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 by-product 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 prior to final disposal; and (iii) the generator maintains documentation demonstrating that the waste was either disposed of in an on-site landfill or consigned to a transporter or disposal facility that provided a written commitment to dispose of the waste in an off-site 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)	(T)

	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	
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 of, 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	By-product 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 by-products 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 by-products 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 by-products 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 by-products produced from coal	(T)
K145	Residues from naphthalene collection and recovery operations from the recovery of coke by-products 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)

Hazard-ous 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)		
Hazard-ous 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

NM Special Waste is a RCRA non-hazardous solid waste. This type of waste has unique handling, transportation, and/or disposal requirements. There are nine types of special waste:

- 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 of, may harm the environment or endanger the public health or safety;
- spill of a chemical substance or commercial product; and
- petroleum contaminated soils (PCS).

RCRA Personnel Training

COURSE 7488

January 2017

Course Objectives

- Recognize generator and waste acceptance criteria (WAC) responsibilities associated with waste identification and characterization;
- Recognize the relevancy and importance of the LANL P2 Program;
- Recognize the storage area requirements for <90-day accumulation areas and treatment and storage facilities (TSFs);
- Identify the purpose of and major elements in the emergency management plan (EMP), contingency plan, and emergency and site-specific plan; and
- Recognize the importance of record keeping and reporting as required by federal and/or state environmental regulatory agencies

Module 1

RCRA Provisions

Module 1 Objectives

- Recognize the responsibilities of federal and state regulatory agencies,
- Recognize characterization of waste [using acceptable knowledge (AK) and sampling and analysis] and the associated generator responsibilities,
- Recognize categories and types of regulated hazardous and nonhazardous waste,
- Recognize exclusions to regulated waste categories,
- Recognize generator treatment requirements and limitations, and
- Recognize considerations for handling excess commercial chemical products that are no longer needed.

Federal Regulatory Drivers

Federal regulatory drivers that affect waste management activities at LANL include

- Resource Conservation and Recovery Act (RCRA)
- Hazardous and Solid Waste Amendments (HSWA)
- Toxic Substances Control Act (TSCA)
- Hazardous Material Transportation Act (HMTA)
- Department of Energy (DOE) Orders

Resource Conservation and Recovery Act (RCRA)

pp. 10–11

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.

Resource Conservation and Recovery Act (RCRA)

pp. 10–11

Major elements of RCRA hazardous waste regulations

- characterization and classification of hazardous waste;
- generator, transporter, and 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 (HSWA) p. 11

The Hazardous and Solid Waste Amendments (HSWA) of 1984 significantly expanded the regulatory scope of RCRA and introduced requirements to ensure that groundwater is protected from chemical contamination.

Requirements under HSWA most applicable to LANL operations include

- Environmental cleanup of contaminated sites and
- Restrictions on future land disposal of many untreated hazardous wastes

Environmental Cleanup (HSWA)

- 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 (HSWA)

Because hazardous chemicals leaching from land-disposed waste 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 land disposal occurs.
- LDRs specify concentration-based treatment standards and technology-based treatment standards.
- The EPA has developed treatment standards for all hazardous wastes. The objective of a treatment standard is to develop concentration levels for treated wastes below which they may be safely land disposed.

Toxic Substances Control Act (TSCA)

The TSCA was decreed by Congress in response to public concern over growing evidence of the toxicological effects of chemicals introduced into the marketplace. TSCA mandates that

- new substances be screened for health and safety hazards before the substances are marketed,
- existing substances be tested for health and safety hazards, and
- hazardous substances be controlled for public protection.

Hazardous Material Transportation Act (HMTA) p. 13

- 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.
- DOT regulations (49 CFR 171–178) for transporting hazardous or mixed waste include requirements for
  - DOT shipping information,
  - packaging,
  - marking,
  - labeling, and
  - placarding.

Department of Energy Orders

LANL is operated by Los Alamos National Security (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.

State Regulatory Drivers

State regulatory drivers that affect waste management activities at LANL include the

- New Mexico Hazardous Waste Act (NMHWA) and
- LANL Hazardous Waste Facility Permit

New Mexico Hazardous Waste Act

The NMHWA

- is implemented through the state hazardous waste regulations;
- 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.

Laboratory Hazardous Waste Facility Permit

- RCRA and state regulations require LANL to have a permit to operate TSFs. LANL's Hazardous Waste Facility Permit, issued through the New Mexico Environment Department (NMED), identifies standards for facility operation, including
  - administrative standards and
  - technical standards.
- LANL's first permit was issued in November 1989. A new permit was issued in November 2010.
- LANL must meet the conditions of the permit or be subject to fines, penalties, and/or notices of violation (NOVs).

LANL Internal Drivers

LANL internal drivers that affect waste management activities at LANL include

- The LANS/DOE Contract;
- P409, *Waste Management*, which outlines procedures for waste operations at LANL; and
- P409-1, *LANL Waste Acceptance Criteria.*

Laboratory policy and procedure documents can be found at ***http://policy.lanl.gov***

Waste Characterization and Classification

Review: Waste Characterization

Waste characterization involves determining the following waste characteristics:

- Physical
- Chemical
- Biological
- Radiological

Review: Characterization Techniques

Waste generators characterize waste streams in several ways.

Two primary methods are

- acceptable knowledge (AK) and
- sampling and analysis.

Acceptable Knowledge

AK is a method used by the waste generator to document the characterization of wastes in lieu of approved sampling and analysis.

Sampling and analysis by approved methods is the most defensible means of waste characterization; however, AK may be substituted for analytical data if it is complete and properly documented.

Acceptable Knowledge (cont)

AK Sources	Examples
Process design documents	N/A
Final safety analysis reports, unreviewed safety questionnaire determinations, and technical safety requirements	N/A

Acceptable Knowledge (cont)

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 **Additional AK sources and examples are found in the student manual.**

Acceptable Knowledge (cont)

Ensure that the AK documentation is relevant and traceable to a waste stream and not merely a list of information sources for a particular process operation. Document information that is accurate, sufficient, current, and relevant to the waste stream's generation, characterization, and management. AK should include, at a minimum,

- a description of the waste generating process, to include
  - a general description of physical/chemical process(s) generating the waste;
  - what materials or inputs are used in the process(s); and
  - how the materials/reagents are used (i.e., are organics used for their solvent properties or as ingredients).

Acceptable Knowledge (cont)

- physical, chemical, and regulatory description of the waste produced;
- a basis for how the waste constituents and contaminants are identified and bounded (e.g., how their min-max ranges are determined); and
- a description of the process controls that are in place to ensure that generated waste remains within the bounds of the waste stream profile (WSP).

Acceptable Knowledge (cont)

Consider including the following information for each waste stream or related waste stream:

- the specific location of the waste-generating process/ operation;
- the time period of generation; and
- the person or persons responsible for the process operations and for waste management, including organization and point of contact information [i.e., the Waste Management Coordinator (WMC)].

Any assumptions made should be identified and documented.

Acceptable Knowledge (cont)

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 missing, it is imperative that sampling and analysis of the waste stream be completed.
- WCATS: Waste Documentation, Course 8504, is designed to familiarize generators with waste stream documentation in the WCATS.

Sampling and Analysis

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

- the generator does not have sufficient AK to characterize the waste,
- unknown constituents exist in the waste stream, or
- analysis is required and/or requested by the receiving TSDF.

Note: Workers may request sampling and analysis services by filling out the online form at the link listed in your student manual.

Hazardous Waste Facility Sampling and Analysis Requirements

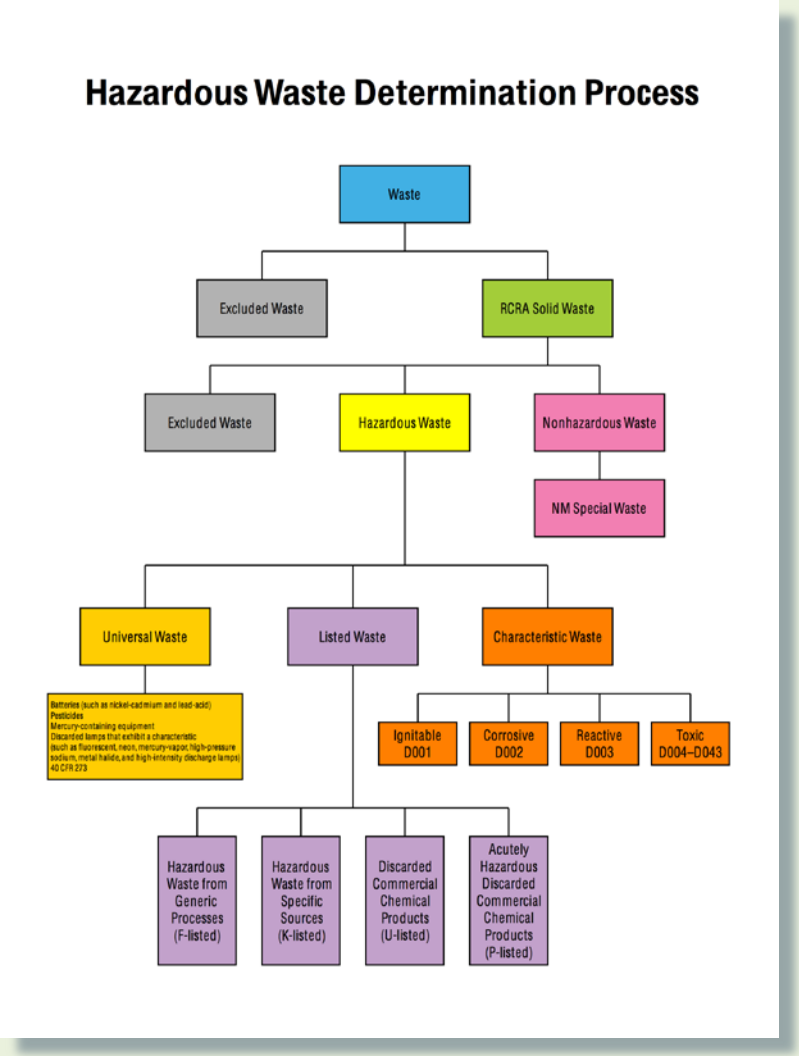
The following sampling and analysis requirements are specified in the waste analysis plan of the LANL Hazardous Waste Facility Permit:

- All routinely generated waste streams with documented waste profiles must be analyzed annually to verify that they have not changed.
- A process change that may affect the waste requires that the waste be analyzed no later than the next time the waste is generated.
- Waste characterization documentation must be recorded in the facility operating record or WCATS.

Sampling and Analysis “Do’s and Don’t”

- DO submit a request for analysis.
- DO recharacterize waste when the process changes.
- DO sample or characterize all unknown waste.
- DO NOT characterize waste without proper training.
- DO NOT guess at RCRA constituent levels.
- DO notify your WMC when the process has changes.

Review: Waste Determination Process

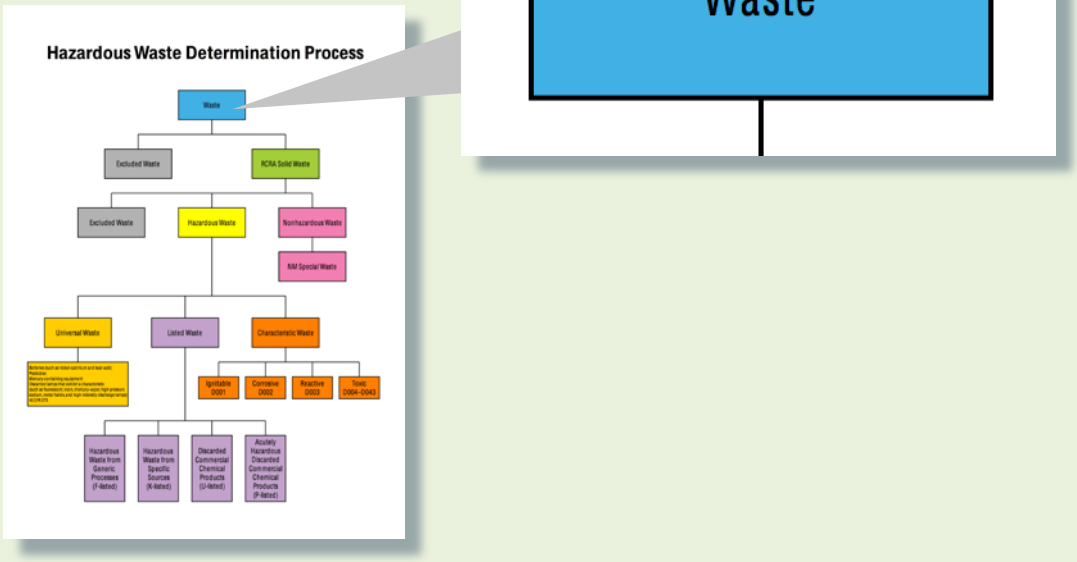


Refer to Appendix A.

Review: Definition of “Waste”

A waste is a material that

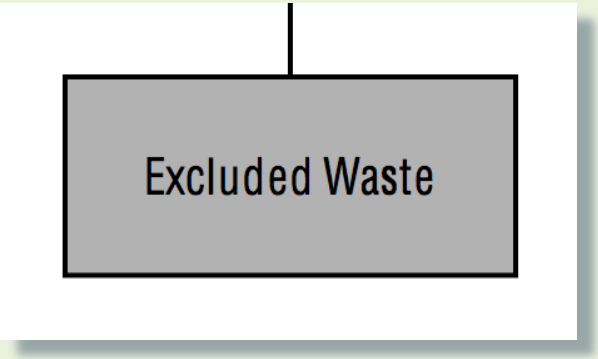
- is no longer being used for its intended purpose,
- has no further use, or
- has been discarded.



Review: Solid Waste Exclusions

These materials are excluded from the RCRA solid waste regulations:

- Domestic sewage and sewage mixtures [Clean Water Act (CWA)]
- Industrial wastewater point source discharges (CWA)
- Source, special nuclear, and byproduct materials [Atomic Energy Act (AEA)]
- Irrigation return flow (CWA)
- PCB wastes and/or asbestos (TSCA)
- *In situ* (in-place) mining waste



Review: RCRA Solid Waste

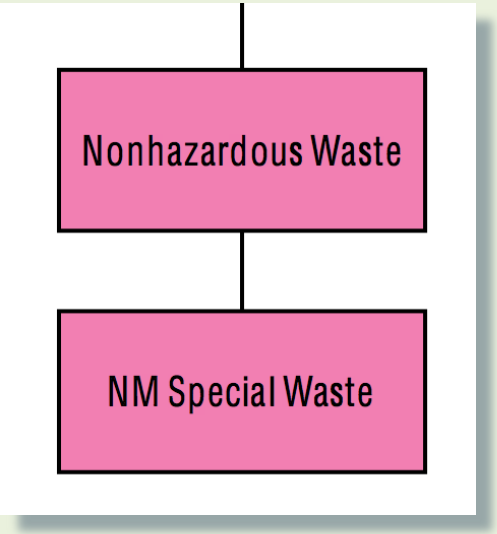
A RCRA solid waste is any discarded material that is a solid, liquid, contained gas, semisolid, or sludge that is

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

Review: New Mexico Special Waste

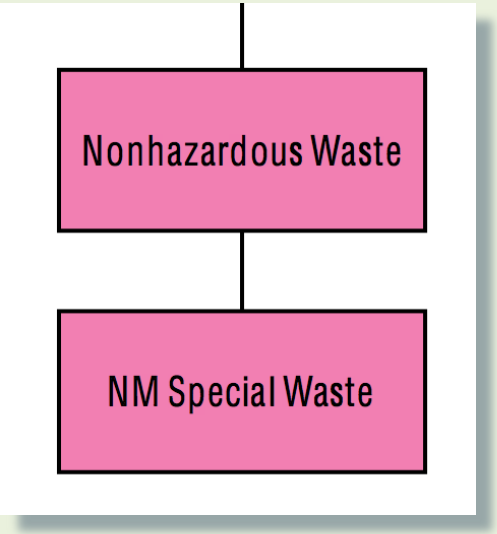
Types of New Mexico special waste include

- treated formerly characteristic hazardous (TFCH) wastes;
- packing house and killing plant offal;
- regulated asbestos waste;
- ash;
- infectious waste;
- sludge;



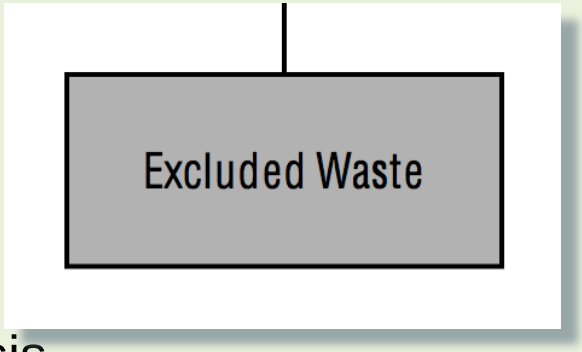
Review: New Mexico Special Waste (cont)

- industrial solid waste that, unless specially handled or disposed of, may harm the environment or endanger the public's health or safety;
- spills of a chemical substance or commercial product; and
- petroleum-contaminated soils.



Review: Hazardous Waste Exclusions

These materials are excluded from being hazardous waste under RCRA:



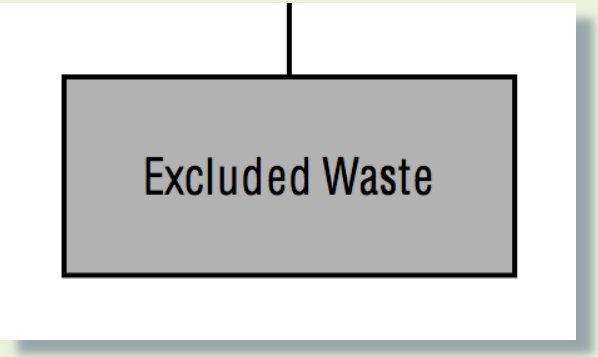
- Samples
  - In transit to or from analysis
  - Stored in a laboratory before or after analysis
  - Used in treatability studies (A treatability study examines pretreatment requirements, optimal process conditions, efficiency, and whether the waste is amenable to the treatment process.)

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

Review: Hazardous Waste Exclusions

- Household waste

Waste generated from household commercial chemical products used at LANL that exhibits a RCRA characteristic or contains listed constituents must be managed as hazardous waste.

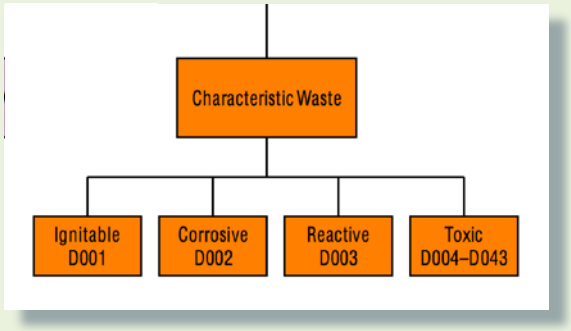


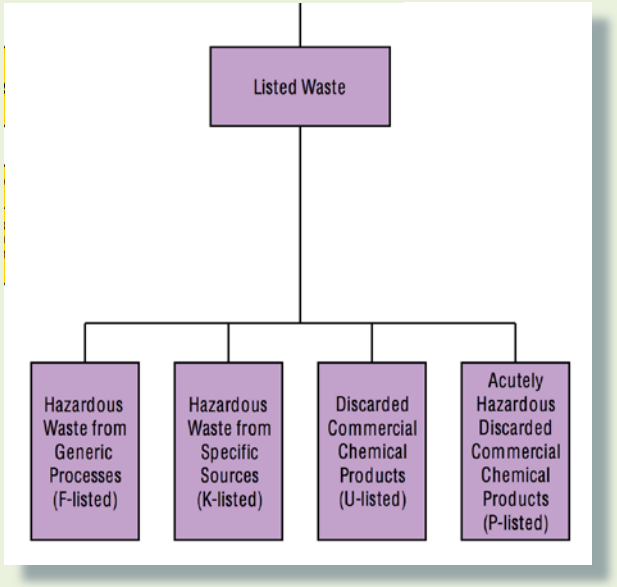
Review: Waste Types

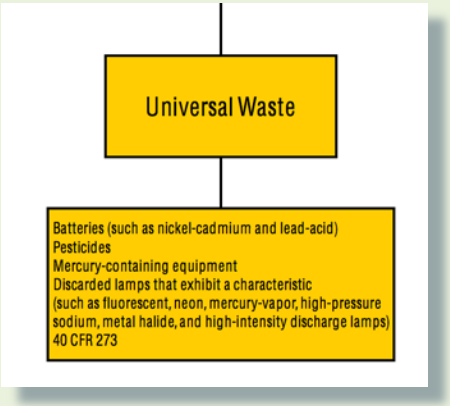
pp. 26-27

The Resource Conversation and Recovery Act (RCRA) defines three hazardous waste types:

- Characteristic waste
- Listed waste
- Universal waste







Review: Characteristic Waste

pp. 26-29

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

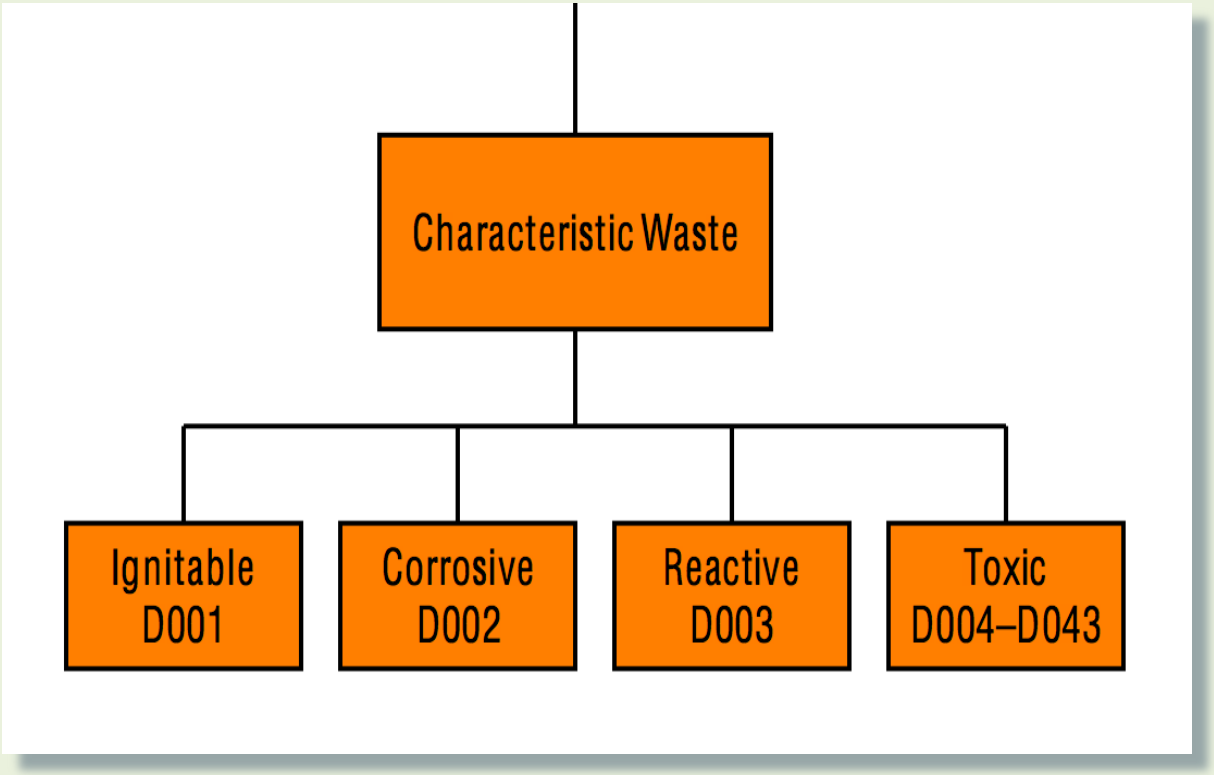
- The solid waste may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; and
- The solid waste may pose a substantial present or potential hazard to human health or the environment when it is improperly treated, stored,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

Review: Characteristic Waste (cont)

pp. 26-29

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

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



Note: Characteristic Waste is described on page 28 of the student manual.

Review: 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; or
- The waste is fatal to humans in low doses or is capable of causing or significantly contributing to an increase in serious, irreversible, or incapacitating but reversible illness.

Review: Listed Waste (cont)

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

- 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.

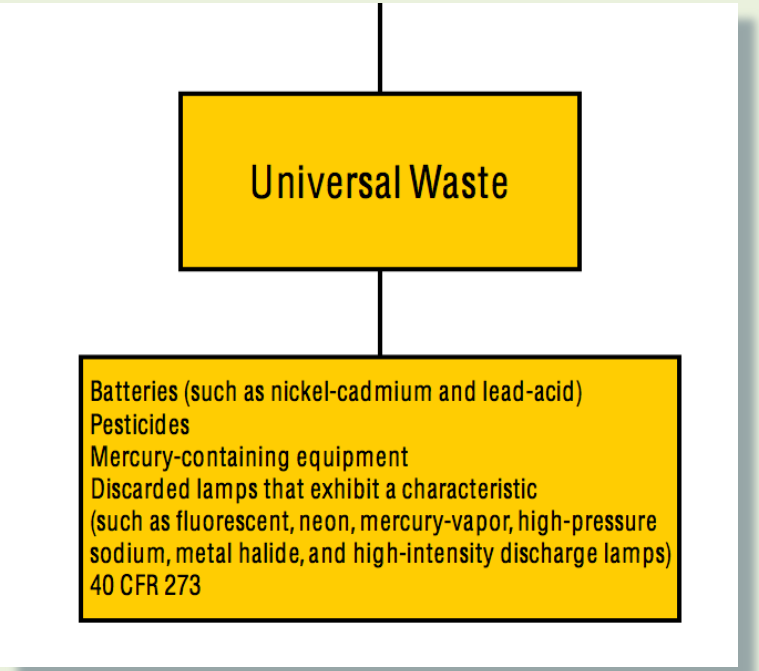
Review: Universal Waste

- 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 [New Mexico Administrative Code (NMAC)] 20 NMAC.

Review: Universal Waste (cont)

Universal waste includes the following hazardous waste items:

- batteries (such as nickel-cadmium and lead-acid),
- pesticides,
- mercury-containing equipment,
- discarded lamps, and
- aerosol cans (in New Mexico).

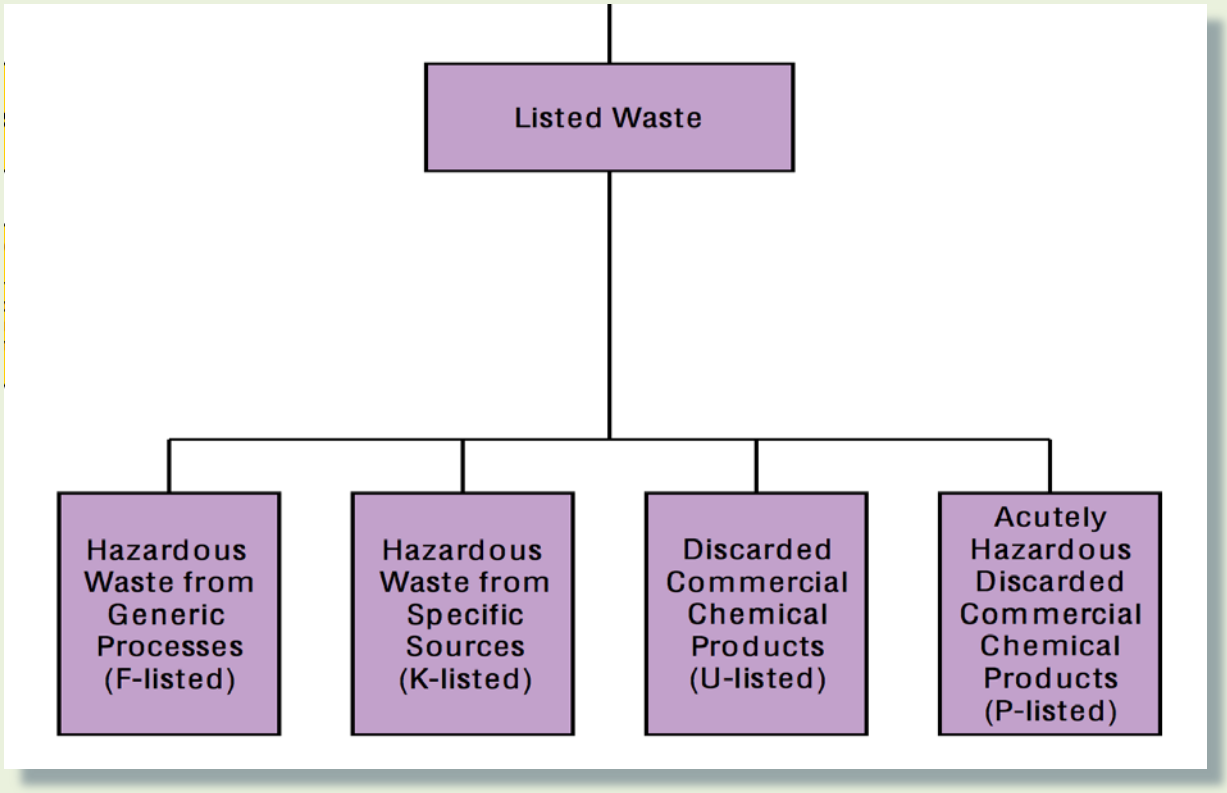


Review: Listed Waste (cont)

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

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

Note: Listed waste is described on page 29 if the student manual.



EPA List of Lists Database

- The searchable database of EPA's Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act is

  http://web-services.gov/lol/

- and lists the
  - name,
  - Chemical Abstracts Service (CAS) number, and
  - RCRA code (if any) for each chemical.

Treatment by a Waste Generator

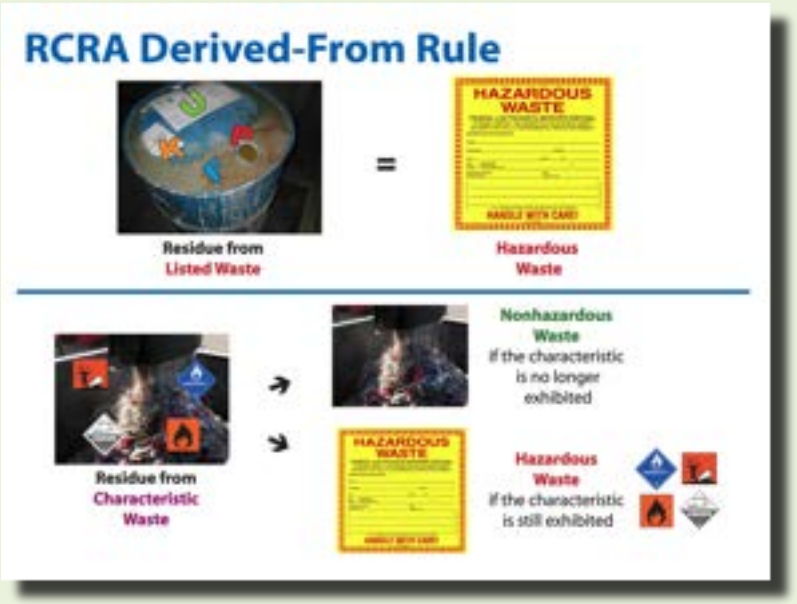
Before treating waste, the generator must get approval from the Environmental Protection and Compliance Division, Compliance Programs Group (EPC-CP). Certain LANL treatment procedures are not allowed to be performed on waste streams. The following table lists three of these procedures and explains why they are not allowed.

Treatment by a Waste Generator (cont)

Treatment Procedure	Why It Is Not Allowed
evaporation	According to the regulations implementing RCRA, waste containers/tanks must be closed, except to add or remove waste. Evaporation requires waste containers/tanks to be opened, which would result in noncompliance.
dilution	Dilution is prohibited, under RCRA LDRs, as a substitute for legitimate treatment for most wastes. Dilution may eliminate the waste characteristic, but it does not reduce the amount of the chemical, and the chemical may find its way into the environment.
thermal treatment	To conduct thermal treatment, a permit is required. Because the regulations do not require <90-day accumulation areas to be covered by a permit, generators must not perform thermal treatment in nonpermitted <90-day accumulation areas.

Review: Hazardous Waste Rules

- Mixture Rule
- Derived-From Rule



Excess Commercial Chemical Products

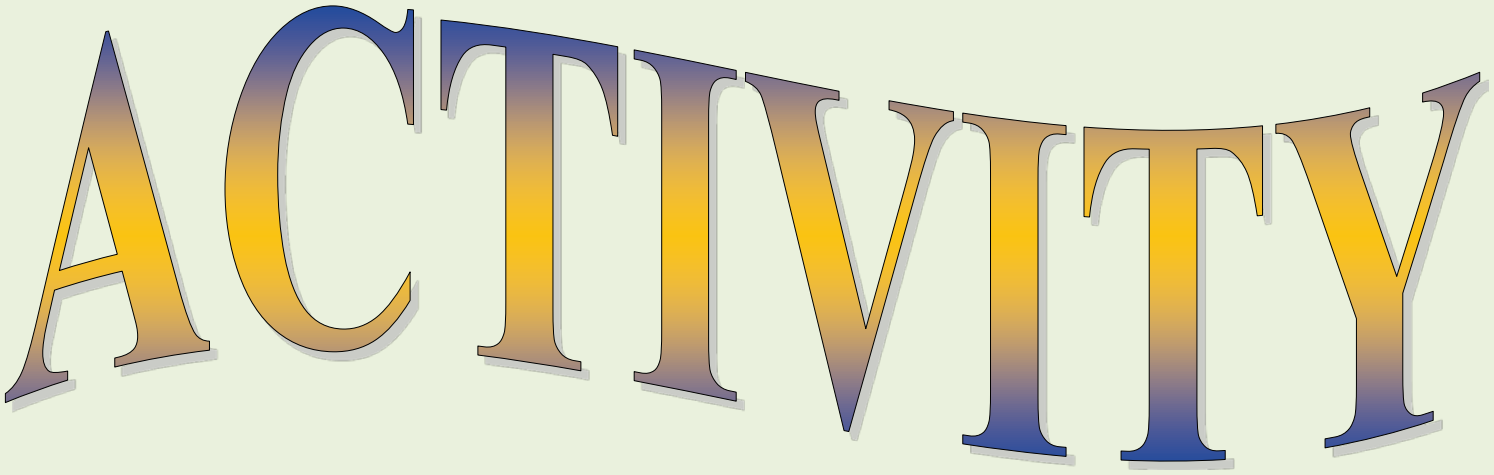
Laboratory's chemical inventory system, ChemLog

- Chemical sharing
- Waste minimization/elimination

Note: If you are a chemical owner, you can access the Laboratory's chemical inventory system at

http://int.lanl.gov/safety/chemical/index.shtml

Bingo!



Module 2

Pollution Prevention

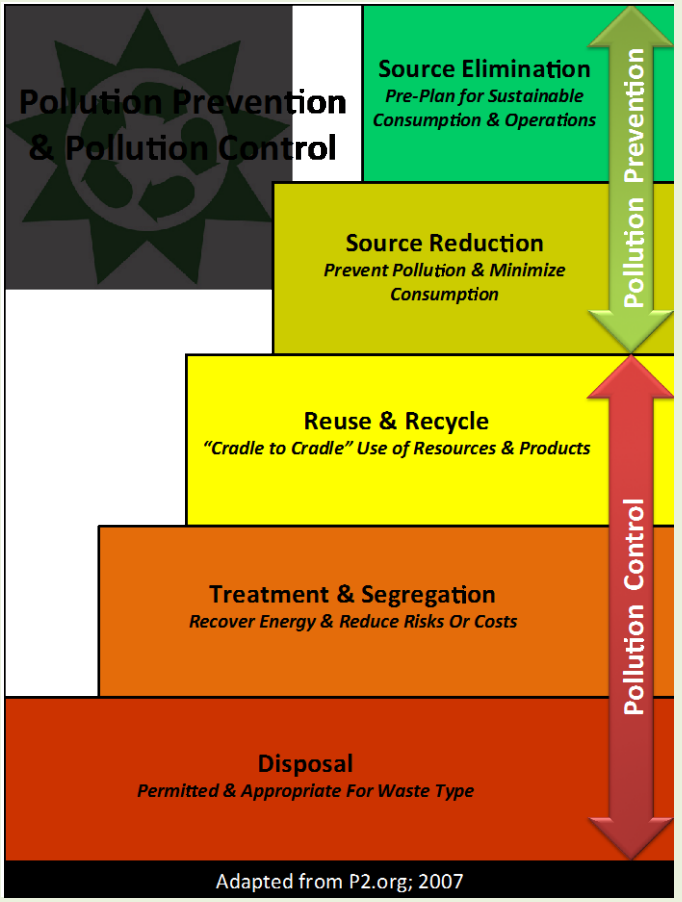
Module 2 Objectives

- Recognize the regulations that guide P2 practices at LANL
- Recognize the P2 goals for LANL
- Recognize the performance indicators used by DOE to assess LANL's P2 efforts
- Recognize P2 techniques that may be used to prevent or minimize pollution

Pollution Prevention (P2) at LANL

P2 describes activities that eliminate or reduce pollution generated by Laboratory operations, including the

- consumption/degradation of resources; and
- generation of wastes, effluents, and discharges.



Regulatory Drivers for P2

The President of the United States, Congress, DOE, and the NNSA recognize the importance of P2. The following table lists regulatory drivers for implementing P2 at federal facilities:

Pollution Prevention Act of 1990
Executive Order 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*
Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*
DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*
DOE Order 436.1, *Departmental Sustainability*
DOE Policy 450.4A, *Integrated Safety Management Policy*
DOE Annual Strategic Sustainability Performance Plan

Regulatory Drivers for P2 (cont)

LANL's Governing Policy on Environment

- describes the basis for executing work and accomplishing missions that have the potential for environmental interactions and
- explicitly states LANL's commitment to continual improvement and pollution prevention.

Regulatory Drivers for P2 (cont)

Environmental Management System (EMS)

- DOE Order 436.1 and the Prime Contract require LANL to implement and maintain an EMS that meets the requirements of the international environmental management system standard, ISO 14001.

- EMS is
  - a consistent, comprehensive, and documented management of all activities, products, and services with environmental interactions;
  - a strategic planning tool for addressing both immediate and long-term risk; and
  - a framework for setting and obtaining environmental performance improvement objectives, targets, and metrics.

P2 Program at LANL

This program

- anticipates future resource use, discharge, waste, and effluent trends;
- takes action before missions are negatively impacted; and
- provides technical support to enable LANL employees to identify and implement source reduction and elimination projects that
  - improve LANL's environmental performance,
  - reduce LANL's environmental risk,
  - lower operating and disposal costs, and
  - enhance safety of operations.

P2 Program at LANL (cont)

The P2 Program also promotes sustainable practices, including

- chemical substitution and chemical share programs;
- sustainable acquisition (green purchasing);
- sustainable (green) building design, operations, and maintenance;
- reuse/recycling; and
- fuel, energy, water, and natural and cultural resource conservation.

P2 Program at LANL (cont)

The P2 Program also

- provides assessments of your operations and processes to help you identify and implement source elimination/reduction projects;
- provides funding through the Annual P2 Project Call to LANL groups for source elimination/reduction projects;
- reports P2 metrics on behalf of LANL as a whole, as required by federal and state regulations and permits; and
- identifies and implements institutional P2 projects and projects on behalf of individual organizations.

P2 Sustainable Practices

- Several techniques are available to prevent or minimize pollution before generation.
- Examples of sustainable practices are provided in the following slides.

P2 Sustainable Practices

Technique	Description
Preplanning for Sustainable Consumption and Operations	• Identify all potential interactions with the environment. • Modify work practices and/or products to eliminate pollution at the source. • Limit resource consumption and source (waste, effluent, discharges) generation by planning, and implementing efficient operations. • Consider the lifecycle of procured items (how it will be used and reused, how it might interact with the environment, how it will be disposed of at the end of its useful life). • Plan to reuse existing items rather than procure new items.
Substitution	• Replace hazardous materials/chemicals with nonhazardous or less-hazardous materials. • Replace disposable or one-time-use materials with reusable materials.

P2 Sustainable Practices (cont)

Technique	Description
Reduction	• Minimize the amount of hazardous material that goes into a process to eliminate/reduce the volume and/or toxicity of the resulting process wastes. • Limit radiologic waste generation by taking only those materials, tools, and electronics necessary to complete work inside the controlled area.
Reuse	• Reuse materials, chemicals, and equipment/ • Reuse byproducts of upstream processes as inputs to downstream processes/
Chemical Exchange	• Share unused/unspent chemicals, materials, and equipment with other LANL organizations through chemical share and swap shop programs/
Recycling	• Reclaim usable material and energy from wastes and byproducts/

What Are Opportunity Assessments?

Pollution Prevention Opportunity Assessments (PPOAs) can be used to examine processes that produce waste and to find ways to reduce or eliminate waste streams. Solutions may include

- process changes,
- equipment modification,
- chemical substitutions,
- recycling, and
- inventory management.

P2 Performance Indicators

LANL is tracking key environmental indicators in an ongoing effort to assess performance against P2 goals. The following areas are monitored for progress:

- sustainable acquisition (green purchasing) of products or services,
- low-level waste reduction,
- transuranic (TRU) waste reduction,
- hazardous waste reduction,
- sanitary waste reduction,
- recycling rate increase,
- greenhouse gas emissions, and
- energy and water use.

P2 Projects Fund

Through the P2 Projects Fund, the P2 Program funds projects that reduce waste or prevent pollution.

- Proposed projects are nominated annually, peer reviewed, evaluated, and funded by LANL's P2 Program Review Committee.
- Information about the program and its deadlines is announced annually on the LANL homepage.

Annual P2 Awards

Every year, as part of April's Earth Day activities, LANL presents P2 awards to individuals or teams who make efforts to minimize or eliminate workplace impacts on the environment.

LANL's Outfall Reduction Program (ORP)

- In 1993, LANL maintained 141 National Pollutant Discharge Elimination System (NPDES) outfalls.
- The ORP has since reduced the number of actively discharging NPDES-permitted outfalls at LANL to nine.
- It is anticipated that only four NPDES permitted outfalls will remain after the next permit cycle, and of those, only two will be actively discharging.
- Full realization of ORP strategy anticipates the reclamation, reuse, and cycling of up to 500 acre-feet per year or approximately 163 million gallons of potable groundwater annually.
- In fiscal year (FY) 2012, the ORP won an NNSA National Best in Class Pollution Prevention Award.

LANL Reduces Environment Impacts

RCRA_Personnel_VG_7488,R5.0

Module 3

RCRA Implementation Requirements

Module 3 Objectives

- Recognize the compliance requirements for RCRA-permitted facilities (such as large-quantity generators and TSDFs)
- Recognize the air emission, documentation, record-keeping, and permitting requirements for RCRA-permitted facilities

Waste Generators

A waste generator is any facility, owner, or operator whose act or process

- produces waste or
- first causes waste to become subject to the regulations.

Note: LANL as a whole is viewed as a single generator, or single generation site, by external regulators.

Requirements for Generators

Waste generators must meet specific requirements pertaining to

- identification
- accumulation of waste
- DOT pretransport handling regulations
- empty container guidelines
- Uniform Hazardous Waste Manifest (UHWM)
- reporting

Fill in the Blanks

TSF Standards

pp. 41-43

1. Documentation requirements

TSF personnel must follow the waste analysis plan, maintain waste-related plans and records, and submit certain reports to comply with the hazardous waste management requirements in 40 CFR Parts 264, 265, and 270 and the LANL Hazardous Waste Facility Permit issued by NMED.

1. 1.1 Operating Record Documentation
2. 1.2 Inspection Schedule
3. 1.3 Contingency Plan
4. 1.4 Waste Analysis Plan
5. 1.5 Uniform Hazardous Waste Manifest
6. 1.6 Land Disposal Restrictions

TSF Standards (cont)

pp. 41-43

1. Documentation requirements

TSF personnel must follow the waste analysis plan, maintain waste-related plans and records, and submit certain reports to comply with the hazardous waste management requirements in 40 CFR Parts 264, 265, and 270 and the LANL Hazardous Waste Facility Permit issued by NMED.

TSF Standards (cont)

pp. 41-43

The following documents are primary drivers for the internal records (such as characterization data, LDRs, waste quantities, inspection records, emergency response procedures, and general operating information) that must be furnished upon request to state and federal regulators:

- operating record requirements,
- waste analysis plan,
- inspection schedule, and
- contingency plan

TSF Standards (cont)

pp. 41-43

1.1 Operating Record Documentation

The operator of a TSF must keep a written operating record at the facility. Waste operations information must be recorded, as it becomes available, and maintained in the operating record until the facility is closed. Required are

- a description and the quantity of each hazardous waste received, and the method(s) and date(s) of its treatment, storage, or disposal at the facility;
- the location of each hazardous waste within the facility and the quantity at each location;

TSF Standards (cont)

pp. 41-43

1.1 Operating Record Documentation (cont)

- records of the results of waste analysis and waste determinations performed;
- summary reports and details of all incidents that require implementing the contingency plan;
- records and results of inspections as required; and
- monitoring, testing, or analytical data.

TSF Standards (cont)

pp. 41-43

1.2 Inspection Schedule

The TSF owner or operator must develop and follow a written schedule for inspecting all equipment that is important to preventing, detecting, or responding to environmental or human health hazards. The inspection schedule is documented as the Inspection Plan within the permit or permit application documentation.

TSF Standards (cont)

1.2 Inspection Schedule (cont)

The TSF owner or operator must

- keep the inspection schedule at the facility,
- identify on the inspection schedule the types of problems for which to look during inspections,
- remedy any deterioration or malfunction of equipment or structures, and
- record inspections in an inspection record.

TSF Standards (cont)

1.3 Contingency Plan

The contingency plan is designed to minimize the hazards associated with

- fires
- spills, or
- explosions.

Note: A more detailed discussion of the contingency plan is provided in Module 6.

TSF Standards (cont)

pp. 41-43

1.4 Waste Analysis Plan

The waste analysis plan is located within the permit or the permit application and must be kept at the TSF. This plan specifies the following:

- the parameters for which each hazardous or nonhazardous waste stream will be analyzed;
- the methods of characterization (sampling analysis as AK) that will be used to test for these parameters;
- the sampling method;

TSF Standards (cont)

1.4 Waste Analysis Plan (cont)

- the frequency of analysis;
- for offsite facilities, the waste analysis that hazardous waste generators have agreed to supply; and
- where applicable, the methods that will be used to meet additional waste analysis requirements.

TSF Standards (cont)

1.5 Uniform Hazardous Waste Manifest

The UHWM tracks waste from cradle to grave and contains the following information:

- name and EPA ID number of the generator, transporters, and facility where waste is to be treated;
- DOT description of the waste being transported;
- quantities of the waste; and
- address of the TSDF where waste is destined.

TSF Standards (cont)

pp. 41-43

1.5 Uniform Hazardous Waste Manifest (cont)

The EPA is careful to track all UHWMs:

Step	Action	
1	A final copy of the UHWM is sent back to the generator from the final destination point.	
2	If . . .	then . . .
	the generator does not receive a copy of the final UHWM within 35 days	the generator must attempt to locate the waste.
	the generator does not receive a copy of the final UHWM within 45 days from the date on which the initial transporter received the waste	the generator must file an exception report with the regional administrator of the EPA.

TSF Standards (cont)

pp. 41-43

1.6 Land Disposal Restrictions

The LDRs, found in 40 CFR 268, impose stringent controls on the land disposal of hazardous wastes. For applicable wastes, the LDRs specify concentration- and/or treatment-based standards.

Note: Specific documentation is required for LDR waste shipments. If you have questions regarding LDRs, contact your WMC.

TSF Standards (cont)

2. Air Emission Requirements

The air emission requirements were developed to limit organic air emissions at TSFs subject to RCRA permitting. The air emission requirements

- require reduction of total organic air emissions for process vents associated with specific operations (for example, distillation or solvent extraction) and
- mandate leak detection and repair standards for defined equipment (for example, valves, pumps, or compressors) at TSFs.

TSF Standards (cont)

3. Corrective Action Program

The corrective action program is implemented through the HSWA, which amended RCRA in 1984. The HSWA gave the EPA broad new corrective action authorities and introduced cleanup requirements based on groundwater protection standards for owners or operators of TSFs and stringent controls on the land disposal of hazardous waste.

LANL's permit to operate hazardous waste treatment and storage units includes a section that prescribes a specific corrective action program for LANL, which focuses primarily on the investigation and cleanup (if required) of inactive sites.

TSF Standards (cont)

4. Groundwater Protection Standards

The TSF owner or operator must take corrective action to ensure that regulated units are in compliance with groundwater protection standards and must

- implement a corrective action program that prevents hazardous constituents from exceeding concentration limits by removing the hazardous waste constituents or treating them in place,
- begin corrective action within a reasonable time after the groundwater protection standards are exceeded,

TSF Standards (cont)

pp. 44-45

4. Groundwater Protection Standards (cont)

- establish and implement a groundwater monitoring program to demonstrate the effectiveness of the corrective action program,
- report in writing to NMED the effectiveness of the corrective action program, and
- submit an application within 90 days to NMED requesting a permit modification if the owner or operator feels that the corrective action program no longer satisfies the requirements stipulated in the regulations.

TSF Standards (cont)

pp. 45-46

5. Record-Keeping Requirements

The table on page 47 of the student manual describes the plans, records, and reports that must be completed by the generator at the TSF.

Activity 3: True or False?

This activity is found on page 46 in the student manual.

Hazardous Waste Permit Program

pp. 46-49

- Types of permits
- Purpose
- Facilities
- Permit application
  - Part A
  - Part B
- Permit modification

Module 4

Waste Storage Areas

Module 4 Objectives

Recognize the

- requirements and limitations of several types of waste storage areas
- container and labeling requirements
- past waste storage compliance violations observed at LANL and the potential consequences of noncompliance
- requirements for the classification and management of empty containers

Storage Area Requirements and Limitations p. 52

The following types of accumulation areas must be registered with EPC-CP:

- satellite accumulation area (SAA),
- <90-day accumulation area,
- universal waste area,
- New Mexico special waste area,
- used oil area, and
- polychlorinated biphenyl (PCB) area.

Storage Area Requirements and Limitations (cont) p. 52

Temporary waste accumulation areas have storage requirements driven by federal and state regulations regarding

- volume limits,
- labeling,
- time constraints,
- location,
- inspections, and
- signs/posting.

Note that Temporary Accumulation Areas include SAA, <90-day, universal, and NM special waste storage areas.

Setting Up a Temporary Accumulation Area

p. 54

Before setting up a temporary accumulation area,

- review the site;
- identify authorized users;
- register the accumulation area by completing the online form in the storage area tracking system databases;
- post the required signage for the particular accumulation area; and
- for storage of radioactive or mixed wastes, contact the radiological control technician (RCT) in your area

Note that Temporary Accumulation Areas include SAA, <90-day, universal, and NM special waste storage areas.

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: Secondary containment should be provided for liquid wastes as needed.

Leaks and Spills

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

Generators and WMCs must follow established emergency response actions as defined by the facilities where work is conducted.

Chemical Compatibility

- If multiple waste streams are stored at temporary waste accumulation areas and/or TSDFs, the waste containers must be compatible with the waste and segregated from incompatible waste streams.
- An incompatible waste stream is defined as a hazardous waste that is unsuitable for
  - placement in a particular device or facility because it may cause corrosion or decay of containment materials or
  - commingling with another waste or material under uncontrolled conditions because of possible adverse effects resulting from commingling.

Waste Container and Labeling Requirements p. 59

Labeling Requirements

Containers holding waste must meet the labeling requirements as indicated in federal and state regulations and internal policy documents. In general, labels must

- be legible and not faded;
- be placed on the container that fully encloses the waste;
- include the accumulation start date, when required;
- include the words Hazardous Waste, even if the waste is pending analysis; and
- include both Radioactive and Hazardous Waste labels if the container holds mixed waste.

Permitted TSFs require a “free liquids” label on containers that contain any liquids at all.

Labeling Requirements

Containers holding waste must meet the labeling requirements as indicated in federal and state regulations and internal policy documents. In general, labels must

- be legible and not faded;
- be placed on the container that fully encloses the waste;
- include the accumulation start date, when required;
- Use Hazardous Waste on labels for known hazardous waste and conservatively for containers with WSPs pending approval, even if the waste is pending analysis; and
- include both Radioactive and Hazardous Waste labels if the contain holds mixed waste.

Classifying and Managing Empty Containers p. 60

EPA Requirements

- According to RCRA, a container once holding RCRA-regulated waste, with the exception of P-listed waste, is considered empty if it is emptied by a method commonly used for that type of container.

DOT Requirements

- According to DOT regulations, a packaging that previously contained radioactive materials and that has been emptied of contents as far as practical must be affixed with an “Empty” label that meets specific dimensions as prescribed in 49 CFR 172.450.

Module 5

Inspections

Module 5 Objectives

- Recognize the authorities of internal and external inspectors.
- Complete the Inspection Record Form (IRF) in accordance with Waste Compliance Group instructions.

Inspections by External Agencies

External Agencies	Inspections	Authority
Regulatory		
• NMED • EPA	• have the right to inspect at any given time • are not required to provide prior notification • inspect LANL files • provide written NOVs • issue compliance orders	have full authority to levy fines and civil and criminal charges
Nonregulatory		
DOE	• announces plans for inspections • provides advance notice to LANL staff • provides a written report of findings, vulnerabilities, or deficiencies	• cannot levy fines for hazardous/mixed waste violations • as owner of LANL, has the right to shut down LANL operations

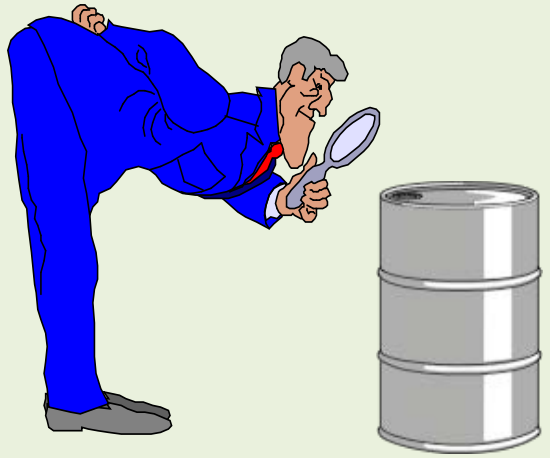
Inspections by Internal Organizations

- Designated facility inspectors
  - Generators
  - WMCs
  - Team/group leaders
  - Trained TSDF workers

Inspection Areas

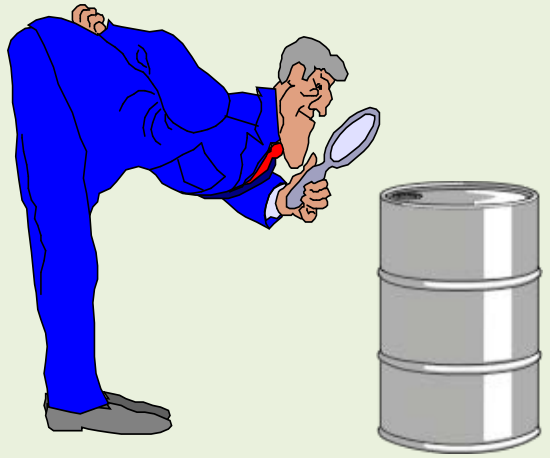
- Permitted TSDFs
- <90-day accumulation areas

Note: Inspections of SAAs, universal waste areas, and New Mexico special waste storage areas are not required; however, EPC-CP and state inspectors will perform inspections of these areas.



Frequency of Internal Inspections

- Weekly or
- Daily, if waste is actively managed in the area on that day (adding, removing, or treating waste).



Consequences of Noncompliance

- Disciplinary action
- Civil violations
- Criminal violations
- Administrative action

Human Performance Improvement

- HPI is an approach used to address human error in the workplace. HPI treats human error as a symptom or a result of deeper problems within a system.
- A leader can help reduce the severity of consequence of the inevitable mistakes by creating an error-tolerant work environment where
  - written and unwritten values encourage the fixing of organization and systemic problems that lead to errors,
  - individuals feel safe in observing and reporting their errors, and
  - nonconsequential errors and near misses are acted on (without malice) to build or fortify defenses and so reduce the risk and/or consequence of such errors in the future.

Inspection Record Form: Purpose

- Checklist for items to be inspected
- Documentation of problems to allow for immediate resolution
- Official documentation of inspection process
- Notation of corrective action taken

Inspection Record Form: Processing

- Use one form per week for both daily and weekly inspections;
- Keep original IRF forever; and
- Keep records orderly.

Inspection Record Form: Part I

- Write NA for
  - items not present in the inspection area at the time of inspection and
  - items not inspected on a given day because the site was not in operation.
- Write OK for
  - all waste items inspected on a given day for which no deficiencies were noted.
- Write AR (Action Required) for
  - deficiencies observed and
  - each subsequent inspection date until the deficiency has been corrected.

Inspection Record Form: Part II

pp. 67–68

- Documenting ARs
  - AR identifier
  - Date
  - Time
  - Description of the deficiency
  - Description of action taken to correct the deficiency
  - Inspector initials
- Supporting documentation

Inspection Record Form: Part III

“Part III is used for NRCs [nonregulatory comments]. NRCs are an observed finding with an opportunity for mitigation within 24 hours per Permit Section 2.6.2. NCRs must be repaired promptly so that the problem does not lead to an environmental or human health hazard. NRCs are not carried forward or reported beyond the initial notation on the IRF. They are tracked by the facility as NRCs, lead to service requests (FSRs) to repair the issue.”

Documentation of the Inspection Process

Module 5 Summary

- Inspections by External Agencies
- Inspections by Internal Organizations
- Inspection Areas
- Frequency of Internal Inspections
- Consequences of Noncompliance
- Inspection Record Form
- Documentation of the Inspection Process

Module 6

Emergency Response

Module 6 Objectives

- Recognize the purpose of and major elements in the emergency management plan (EMP) and the contingency plan
- Recognize the elements that must be included in an emergency and site-specific plan and the emergency/ communication equipment required at <90-day accumulation areas and TSDFs

Emergency Notification

If an emergency occurs during working hours,

- Dial 911 
- Notify line management
- For non-emergencies, call 7-6211 

Emergency Preparedness and Response Plans

pp. 78–81

- Emergency Planning and Preparedness (EO-2)
- Spill prevention, control, and countermeasure plan
- Emergency and site-specific plan
- Contingency plan

Contingency Plan: Purpose

To minimize hazards to human health or the environment from

- fires,
- explosions, or
- any unplanned sudden or nonsudden release of hazardous waste constituents to air, soil, or surface water.

Contingency Plan: Content

pp. 79–81

- Response actions
- Hazardous waste management provisions
- Arrangements agreed on by local authorities
- Emergency coordinators
- Emergency equipment
- Evacuation plan

Contingency Plan: Implementation

pp. 79–80

Implementation conditions

- Fire
  - Involves hazardous or mixed waste
  - Threatens to volatilize or ignite
- Spill
  - Cannot be contained
  - Precipitation threatens to move the material
  - Causes the release of flammables
  - Results in toxic fumes
  - Natural disaster threatens containment integrity
- Explosion
  - Involves hazardous or mixed waste
  - Imminent danger exists

Emergency/Communication Equipment

- Spill-control equipment
- Fire-control equipment (as appropriate)
- Emergency telephone and alarm
- Eyewash and safety shower (as appropriate)

Salvage and Cleanup

Line managers are responsible for

- properly managing recoverable waste,
- performing visual inspections,
- sampling, and
- decontaminating.

Post-Emergency Assessment

- Identify the cause of the emergency
- Evaluate the effectiveness of the response

Module 6 Summary

- Emergency Notification
- Emergency Response Reporting
- Emergency Preparedness and Response Plans
- Contingency Plan—Purpose, Content, Implementation
- Emergency/Communication Equipment
- Salvage and Cleanup
- Post-Emergency Assessment