Annual RCRA Training for Lab Personnel

University of Houston Clear Lake

Environmental, Health and Safety Department

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Resource Conservation and Recovery Act (RCRA)

RCRA is a federal law which was passed by Congress in 1976. It amended the Solid Waste Disposal Act of 1965. The law can be found in USC Title 42, Sections 6921-6939f.

RCRA addresses **waste management, disposal and recycling**, issues not covered by the Clean Water Act and the Clean Air Act. Its purpose is preventative in nature and intended to prevent future Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) actions and Superfund (improperly managed hazardous waste) sites requiring extensive money for cleanup.

Regulations issued by the EPA became effective on 11/19/1980. These regulations can be found at 40 CFR 260-279 and 40 CFR 124.

Defining Hazardous Waste

In order to be regulated as a hazardous waste, a secondary material must be:

- Considered a waste under RCRA and
- Hazardous as defined in 40 CFR 261.21-261.33

RCRA states that a waste is any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities.

It is important to note that the definition of a waste may be *called* a "solid" waste, to mean that it is tangibly considered a waste. It is **NOT** actually limited to wastes that are physically solid. Many "solid" wastes are liquid, semi-solid, or gaseous material.

Defining Hazardous Waste

A waste is <u>any material that is discarded</u> by being:

- **Abandoned**: The term abandoned means thrown away. A material is abandoned if it is disposed of, burned, incinerated, or sham recycled
- **Inherently Waste-Like**: Some materials pose such a threat to human health and the environment that they are always considered solid wastes; these materials are considered to be inherently waste-like. Examples of inherently waste-like materials include certain dioxin-containing wastes
- **Discarded Military Munitions**: Military munitions are all ammunition products and components produced for or used by the U.S. Department of Defense (DOD) or U.S. Armed Services for national defense and security. Unused or defective munitions are solid wastes when:
  - Abandoned (i.e., disposed of, burned, incinerated) or treated prior to disposal;
  - Rendered nonrecyclable or nonusable through deterioration; or
  - Declared a waste by an authorized military official.

  Used (i.e., fired or detonated) munitions may also be solid wastes if collected for storage, recycling, treatment, or disposal.
- **Recycled in Certain Ways**: Used **in or on the land** in a manner constituting disposal, burned for energy recovery, or accumulated speculatively (too much for too long). There are many specific exclusions to the definition of solid waste listed in the Code of Federal Regulations (CFR) at 40 CFR section 261.4(a) that are related to recycling.

Defining Hazardous Waste

Wastes are defined as hazardous by EPA if they are **Specifically listed** on one of four hazardous waste lists, **or** if they exhibit one of four **Characteristics of Hazardous waste** located in Subpart C of Part 261.

Specifically Listed - EPA has studied and listed as hazardous in Subpart D of Part 261, hundreds of specific chemicals and industrial wastestreams in four lists (F, K, P, and U code lists).

Specifically listed chemical wastes are hazardous because they are known to be harmful to human health and the environment when not managed properly, regardless of their concentrations.

Specifically Listed Hazardous Wastes

The four Hazardous Waste lists are:

- **F-code list** designates as hazardous particular wastes from certain common industrial or manufacturing processes. Because the processes producing these wastes can occur in different sectors of industry, the F-listed wastes are known as wastes from non-specific sources. The F list is codified in the regulations at 40 CFR §261.31. *The first few F-codes include common solvents used in a lab.*
- **K-code list** - The K list designates as hazardous particular waste streams from certain specific industries. K-listed wastes are known as wastes from specific sources. The K list is found at 40 CFR §261.32, and are not likely applicable to UHCL.
- **P and U code lists (Discarded Commercial Chemical Products)** - These two lists are similar in that both list pure or commercial grade formulations of certain specific unused chemicals as hazardous. Both the P list and U list are codified in 40 CFR §261.33. A P or U waste code may be applicable if the material is an *unused* commercial chemical product, consisting of the commercially pure grade of the chemical, any technical grades of the chemical, and all formulations in which the chemical is the sole active ingredient (§261.33(d)). P codes are Acutely hazardous wastes, and have very low shipping quantities. Only one or two apply to UHCL.

Characteristically Hazardous Wastes

Even if the wastestream does not meet any of the four specific lists explained previously, it may still be considered a hazardous waste if it exhibits a Characteristic. **The following four characteristics are designated by EPA in Part 261, Subpart C as Hazardous Waste:**

- **Ignitability (D001) -** Ignitable wastes create fires under certain conditions or are spontaneously combustible, or have a flash point less than 60 °C (140 °F). The characteristic of ignitability is found at 40 CFR §261.21.
- **Corrosivity (D002) -** Corrosive wastes are acids or bases (pH less than or equal to 2 or greater than or equal to 12.5) that are capable of corroding metal containers, such as storage tanks, drums, and barrels. The characteristic of corrosivity is found at 40 CFR §261.22.
- **Reactivity (D003) -** Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when mixed with water. The characteristic of reactivity is found at 40 CFR §261.23.
- **Toxicity (D004-D043) -** Toxic wastes are harmful or fatal when ingested or absorbed (e.g., containing mercury, lead, etc.). When toxic wastes are disposed of on land, contaminated liquid may drain (leach) from the waste and pollute ground water. Toxicity is defined through a laboratory procedure called the Toxicity Characteristic Leaching Procedure (TCLP). The toxicity characteristic is found at 40 CFR §261.24.

Defining Hazardous Waste

Examples of Hazardous Waste found in the lab include the following:

- Experiment products/byproducts no longer needed
- Solutions made specifically for an experiment that is over
- Chemicals past their shelf life
- Chemicals where the container or contents are starting to degrade
- Contaminated chemicals
- Unwanted or unneeded chemicals
- Contaminated containers, PPE, wipes
- Materials from spill cleanups

Hazardous Waste Characterization

Generators are responsible for characterizing their waste as hazardous and must determine whether a waste exhibits a characteristic by either testing or applying knowledge of the hazardous waste characteristic of the waste (§262.11).

UHCL Employee Requirements for this are discussed on slide 16.

If any assistance is required – please contact Hank Grotewold at 281-283-2104 (x.2104) or at grotewold@uhcl.edu.

Defining Generator

A generator of hazardous waste is defined at 40 CFR 260.10 as any person, by site, whose act or process produces hazardous waste identified or listed in Part 261 or whose act first causes a hazardous waste to become subject to regulation.

The US **EPA regulates hazardous waste** under the Resource Conservation and Recovery Act (RCRA) to ensure these wastes are managed in ways that protect human health and the environment.

Generators of hazardous waste are defined as very small, small, or large based on the amount of hazardous waste they generate in a calendar month, not the size of their business or facility.

The University of Houston – Clear Lake is recognized as a generator under RCRA and must follow all applicable regulations therein.

Categories of Generators

Recognizing that generators produce waste in different quantities, the US EPA established three categories of generators in the regulations:

- **Very Small Quantity generators (VSQG)**
- **Small Quantity Generators (SQG)**
- **Large Quantity Generators (LQG)**

The volume of hazardous waste each generator produces in a calendar month determines which regulations apply to that generator.

Categories of Generators

Very Small Quantity Generators (VSQG's)

Very Small Quantity Generators (VSQG's) generate 100 kilograms or less per month of hazardous waste or one kilogram or less per month of acutely hazardous waste. Requirements for VSQG's include:

- Identification of all hazardous wastes generated
- VSQG's may not accumulate more than 1,000 kilograms of hazardous waste at any time
- VSQG's have no time limit on how long they store their waste so long as they do not exceed 1,000 kilograms of stored waste.
- VSQG's must ensure that hazardous waste is delivered to a person or facility who is authorized to manage it

Categories of Generators

Small Quantity Generators (SQGs)

Generate more than 100 kilograms, but less than 1,000 kilograms of hazardous waste per month and less than 1 kilogram of acutely hazardous waste per month.

Major requirements for SQGs include:

- Identification of all hazardous wastes generated
- SQGs may not accumulate more than 6,000 kilograms of hazardous waste at any time
- SQGs must ensure that hazardous waste is delivered to a person or facility who is authorized to manage it
- SQGs may accumulate hazardous waste on-site for 180 days without a permit (or 270 days if shipping a distance greater than 200 miles).
- SQGs must comply with the hazardous waste manifest requirements at 40 CFR part 262, subpart B and the pre-transport requirements at 40 CFR §§262.30 through 262.33.
- SQGs must manage hazardous waste in tanks or containers subject to the requirements found at 40 CFR §§262.16(b)(2) and (3)
- SQGs must comply with the preparedness and prevention requirements at 40 CFR §§262.16(b)(8) and (9), and the land disposal restriction requirements at 40 CFR part 268
- There must always be at least one employee available to respond to an emergency. This employee is the emergency coordinator responsible for coordinating all emergency response measures. SQGs are not required to have detailed, written contingency plans.

Categories of Generators

Large Quantity Generators (LQGs)

Generate 1,000 kilograms per month or more of hazardous waste or more than one kilogram per month of acutely hazardous waste. Major requirements for LQGs include:

- Identification of all hazardous wastes generated
- LQGs may only accumulate waste on-site for 90 days. Certain exceptions apply.
- LQGs do not have a limit on the amount of hazardous waste accumulated on-site.
- LQGs must ensure that hazardous waste is delivered to a person or facility who is authorized to manage it
- Hazardous waste generated must be managed in tanks, containers, drip pads or containment buildings subject to the requirements found at 40 CFR §§ 262.17(a)(1)-(4) and, specifically for drip pads and containment buildings, 40 CFR part 265, subparts W and DD, respectively.
- LQGs must comply with the hazardous waste manifest requirements at 40 CFR part 262 subpart B and the pre-transport requirements at 40 CFR §§262.30 through 262.33.
- LQGs must comply with the preparedness, prevention and emergency procedure requirements at 40 CFR part 262 subpart M and land disposal restriction requirements at 40 CFR part 268.
- LQGs must submit a biennial hazardous waste report.

UHCL Status under RCRA

Under RCRA Regulations, the University of Houston – Clear Lake is currently considered a small quantity generator (SQG) and must comply with all of the requirements thereunder. RCRA regulations are designed to ensure that UHCL is responsible for all of our hazardous waste from cradle (initial generation) to grave (final disposal). Some of our responsibilities include (but are not limited to) the following:

- Ensuring all Requirements for Treatment, Storage and Disposal of Hazardous and Non-Hazardous wastes are followed.
- Ensuring that only those with a permit (and facilities and insurance to do so) may accept, treat and dispose of hazardous waste.
- Ensuring that wastes are handled by a licensed Treatment, Storage, and Disposal Facility (TSDF).
- If waste is improperly disposed of, generators are responsible for paying for cleanup and additional costs to then properly dispose of the waste.

Improper Waste Disposal

Examples of Improper Disposal:

- Sending waste to an **Unlicensed/Unpermitted** company or person, or someone who does not have the facilities to treat your wastes and test that they meet the air emissions, wastewater discharge and landfill criteria.
- Allowing waste or experiment remnants to **Evaporate** in a hood.
- **Pouring** hazardous waste down the drain – our wastewater treatment facility is not permitted to accept hazardous waste. **Do NOT pour any chemicals down the drain.** *If chemicals or oil are accidentally poured or leaked into the drain, Clear Lake Water Authority must be notified.*
- **Indefinite Storage** of unusable chemicals or chemicals without any anticipated future use is prohibited. Improper inventory upkeep can be viewed as storage in lieu of disposal.
- **Donating** unneeded materials **is prohibited**. This could expose UH-CL to unnecessary liability if the recipient violates any EPA regulations.

RCRA Waste Types

Classes of Waste:

- Hazardous
- Acutely Hazardous Waste
- Universal Waste (fluorescent bulbs, batteries, paint, used oil, electronics)
- Non-Hazardous (but still regulated) chemical and other waste

HAZARDOUS WASTE

- Toxic—TCLP test of 40 listed chemicals (Benzene, Lead, Mercury…)
- Reactive—unstable, reacts violently with water or air or potentially explosive
- Ignitable—liquid flash point <140°F or non-liquid spontaneously combustible at STP
- Corrosive—liquid with pH <2 or >12.5
- Specifically listed as hazardous in regulations

RCRA: Waste Types

Specifically Listed as Hazardous

- Examples: common solvents like toluene, xylene, acetone;
- Aniline, Carbon disulfide, Tetrahydrofuran

Non-hazardous but still regulated Class 1 Wastes

- Water leachate test (landfill simulation) of 150 chemicals including Nickel, Lead, ethylene glycol
- Containing >20ppm reactive Cyanides, or PCB's >50ppm
- Oily materials (Total Petroleum Hydrocarbons ≥1500ppm)
- Flammable—liquid F.P. between 140°F and 150°F or readily ignitable solid under normal conditions
- Corrosive—solid with pH <2 or >12.5 with DI water

RCRA: Waste Labeling

HAZARDOUS WASTE

Name: _____ Date Filled: _____

Contents: _____

_____

___Ignitable (Flash Point <140) ____Corrosive (pH<2 or >12.5)

___Reactive(Explosive, Air/Water reactive, cyanide/sulfide releasing)

___Halogen ___Oxidizer ___Contains metal(s):_____

⚠ Warning: Peroxide-Forming Chemical

This chemical can form peroxides during storage and has a limited shelf life. Containers must be discarded within 12 months if unopened, or tested and disposed of according to campus procedures and applicable group.

Test or Dispose of every:

Group A – 3 months; Group B, and C Inhibited – 12 months

Group C – Uninhibited – every *24 hours*

Date Received_____ Date Opened _____

Date Tested_____ Test Result_____

Date Tested_____ Test Result_____

- **Store in tightly closed original container.**
- **Avoid exposure to light , air, and heat.**
- **Do not move or open container if crystals, discoloration, or layering are visible. Contact EH&S at 2106, 2104, 2107, or 2110**
- **Always check for Peroxides before distilling or concentrating Review MSDS and Handling Guide(s) prior to use**

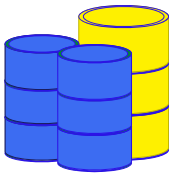
Here is our waste label and other important chemical labels. This is the information we need to determine how to properly treat and dispose of waste.

PYROPHORIC MATERIAL
This material will **ignite and burn or react** explosively **with AIR** or WATER

⚠ PEROXIDE FORMER
POTENTIALLY EXPLOSIVE!
Routine Testing Required

PEROXIDIZER
POTENTIALLY EXPLOSIVE!
DO NOT OPEN! Remote Opening & Stabilization Required!

Waste Labeling



These are waste labels typically used for drums, buckets, or pallets

HAZARDOUS WASTE
FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

HANDLE WITH CARE

GENERATOR:
University of Houston – Clear Lake
2700 Bay Area Blvd
Houston, TX 77058-1098
(281) 283-2106

Area/Room#: _____
Name: _____
Date Started Filling: _____ Date Filled: _____
Contents: _____

If waste is 5gal or larger, must have a waste stream form on file with EHS, and a waste profile approved with the chemical waste vendor.

NON-HAZARDOUS CHEMICAL WASTE

CHEMICAL WASTES ARE SUBJECT TO TREATMENT AND/OR DISPOSAL THROUGH ENVIRONMENTAL HEALTH & SAFETY

GENERATOR:
University of Houston – Clear Lake
2700 Bay Area Blvd
Houston, TX 77058-1098
(281) 283-2106

Area/Room#: _____
Name: _____
Date Started Filling: _____ Date Filled: _____
Contents: _____

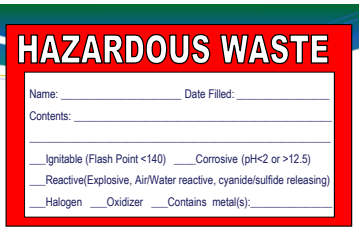
UNIVERSAL WASTE

BATTERIES, LAMPS, PAINT & PAINT RELATED MATERIAL, MERCURY SWITCHES

GENERATOR:
University of Houston – Clear Lake
2700 Bay Area Blvd
Houston, TX 77058-1098
(281) 283-2106

Area/Room#: _____
Name: _____
Date Started Filling: _____ Date Filled: _____
Contents: _____

Waste Labeling



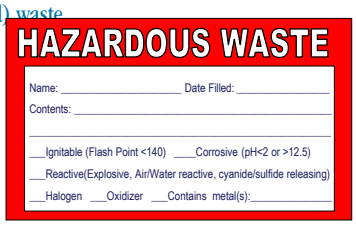
All Waste Containers **MUST:**

- Be Labeled when the **First Drop** of waste goes in the container
- Not have any other Contradicting labels (cover or mark out prior contents)
- **List all Contents legibly**
- **Provide the name of a contact person** for questions
- Have the **Date marked** when filled/finished with the container

These are waste labeling regulatory requirements and the information needed so the waste can be properly treated and disposed of according to regulation. Waste is ***not billed back*** *to the department or individual researcher.*

Chemical Waste Management

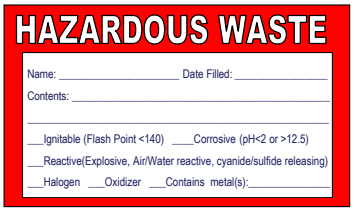
- **All chemical wastes are collected for disposal by an outside vendor.**
- Because of the hazardous waste lists and other waste requirements, all chemical waste is handled as hazardous waste until evaluated by EHS or our waste handler.
- Chemical or biological waste shall be collected in their respective, properly labeled waste containers.
- Maintain a clean working environment for housekeeping safety and to avoid appearance of improperly managed (unlabeled, poorly containerized) waste.
- Never dump chemical waste in regular trash, broken glass containers, or down the sink.
- Never dump contaminated glass in the broken glass container. Contaminated glass will need to be containerized and disposed of as hazardous waste.



Chemical Waste Management

- A Hazardous Waste label MUST be applied to any container used for waste accumulation PRIOR to any waste being put into it.
- The label MUST BE COMPLETELY FILLED OUT.
- The label must include all contents (even water) and their concentrations.
- A contact name MUST be included in case there are any questions regarding the waste.
- Hazards must be noted per RCRA, GHS, and Hazcom regulations.
- The '**Date Filled**' line is the date the container is either full or done being used, (right before the container is moved to a waste storage area for EHS disposal. DO NOT complete the date while the container is still in use in the lab (satellite accumulation area) to accumulate waste.

  Only **fill it in after you are done using it**.



Container Management

Waste Containers must be in **good condition**:

- Container must be compatible with the waste, and suitable for storing chemicals (not a household container)
- No metal containers
- Lab (pack) size of < 5 gallon
- Proper fitting, airtight lid kept closed

If the container is compromised, pack it in another compatible container or bag and place in containment tray

Container Management

Inventory Containers must also be in **good condition**, otherwise they need to hit the waste shelf. Review stock chemicals routinely.

Here are some indicators:

- Containers with bulging or bubbly lids
- Plastic yellow and brittle, bulging or cracked
- Inverted containers (usually indicates a leak)
- Liquid contents crystallized or evaporated

Waste Rules

Waste Segregation:

- Mixture Rule: one drop of hazardous = hazardous (all of the mixture!)
- Don't mix different types of wastes – No cost benefit
  - Combining wastes in containers can lead to disaster if something incompatible gets added to the container.

No Waste Treatment unless you're a licensed Treatment, Storage and Disposal Facility (TSDF).

Containers must be Closed!

Do NOT allow materials to evaporate!

Cadmium and organic solvent waste bulking explosion example courtesy of another state University.

Waste Storage Areas

Satellite Accumulation Areas: any waste area **at or near the point of waste generation**. Each lab generates waste, so each lab's waste container areas are considered Satellite Accumulation areas. The specific **requirements** for waste containers **while accumulating/filling** them are:

- **Keep closed** to prevent evaporation or spillage (if knocked over)
- **Identify Contents** (labeled fully per Hazard Communication requirements) **and** words Non-Hazardous or Hazardous Waste
- **When full, move to storage area.** If you should ever have 55gallons of waste, it would have to be moved within 3 days.

Waste Storage Areas: Bayou Solvent Storage Room 3520AA, & STEM 3125

- Can store containers up to 180 days
- Containers must be secured closed and **waste label filled out completely** with contents, contact name, and date container filled

Non-Hazardous Waste

Trash (solids only)

- Paper products, plastics and other uncontaminated non-hazardous substances may be placed in the trash containers with these labels.
- Never place any glass (broken or not) in trash containers.
- Never place any needles or sharps in trash containers.
- Never place any chemicals or chemical residues in trash containers

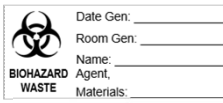
Glass

- Broken glass and other glass waste must be disposed of in a special container show at the right.
- Before any glass is thrown away, it must be clean of any chemical or biological contamination. Contaminated glass must be containerized and disposed of as hazardous waste.
- Never place any needles, sharps or non-glass waste into these boxes.

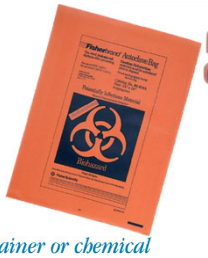
Biohazardous Waste Containers

All Biohazardous Waste is Regulated Waste

- Includes blood and Other Potentially Infectious Material (OPIM) such as human fluids (liquid, semi-liquid, or dry).
- Containers must be rigid and leak proof.
- Containers must be sealed and impervious to moisture.
- Closed containers must be used for aerosols.



Containers Must Use Proper Labeling



- Biohazard Symbol labels on containers.
- Orange heat withstanding bags for autoclaves.
- Moisture must be present in bag when autoclaved.
- Absorbent for free liquids when shipped offsite.
- *Contaminated glass or sharps should go in sharps container or chemical waste container, not in plastic bag.*
- Orange bags must be placed in black trash bag after autoclave or disinfection.
- Put sticker label on black trash bag indicating treatment.

This waste has been treated by an approved method in accordance with 25 TAC 1.136

Biohazardous Waste Containers

Sharps

- Needles, razorblades, scalpels, probes, or other small, sharp objects that could puncture a trash bag go in rigid sharps containers.
- Note and adhere to the maximum "full" line at ¾ full.
- One cited source of Needlestick Injuries (and the spread of infectious diseases) is from overfilled sharps containers.

- Chemically contaminated sharps get picked up by our chemical waste vendor.
- Sharps contaminated with blood, human bodily fluid, or biological materials get autoclaved or picked up by our medical waste vendor.

Quiz - Matching

1) When does the waste label go on?
2) What should you remove if reusing a container for waste?
3) In order to pour any lab materials down the sink, you need _____.
4) You have to be sure the waste container is in _____ and _____.

Choices:

a) specific written approval from the wastewater authority
b) good condition compatible with contents
c) upon first drop waste added to the container
d) all other contradicting labels

RCRA Take Home

- Collect all your waste in compatible containers which are in good condition
- Label all containers properly with all contents, properties, and your contact information
- Keep all waste containers closed
- Move all waste containers to hazardous waste storage when done

If there's something you're unsure about, ask!

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