1. Introduction

Hazardous waste disposal is governed by the EPA and the TCEQ through State and Federal regulations. The purpose of environmentally sound disposal methods is to prevent harm to the water, land, and air. TAMUS-HSC complies with all hazardous waste disposal regulations.

2. Penalties of Noncompliance

Noncompliance with any hazardous waste regulation may result in substantial fines and penalties for the Health Science Center. In addition, individual generators may be personally liable. Generators may be cited or fined for numerous types of violations. Violations range from improperly labeling a waste container to intentionally disposing of hazardous waste incorrectly.

3. Role of the Component Safety Officer

Compliance with this program is very demanding — it requires full cooperation by all employees. The component safety should be notified of any event involving the disposal of hazardous waste. The main focus of this program is chemical waste management. The program does not include procedures for the management of radioactive, infectious, biological, or nonhazardous waste.

4. Definitions

Central Accumulation Area: Area(s) designated to be used for the storage of hazardous wastes prior to shipment to permitted disposal facilities.

Disposal: The discharge, deposit, injection, dumping, spilling, or placing of any solid waste or hazardous waste (whether containerized or uncontainerized) into or on any land or water so that such solid waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any water, including ground waters.
**Generator:** Any person, by site, who produces municipal hazardous waste or industrial solid waste; any person who possesses municipal hazardous waste or industrial solid waste to be shipped to any other person; or any person whose act first causes solid waste to become subject to regulation.

**Hazardous Waste:** Any solid waste material listed or identified in Title 40 Code of Federal Regulations, Part 261, Subpart C or D or exhibiting the characteristics of ignitability, corrosivity, reactivity, or E.P. toxicity also defined in Part 261. Tables containing the listing and characteristics of hazardous wastes are shown at the end of this chapter.

**Mixed Waste:** A radioactive waste that is also a hazardous waste.

**Satellite Accumulation Area:** An area, system, or structure for temporary accumulation of hazardous waste prior to transport to the central accumulation area.

**Solid Waste** Any garbage, refuse, sludge from a waste treatment plant, water treatment plant, or air pollution control facility or other discarded material. Solid waste can be solid, liquid, semi-solid, or contained gaseous material resulting from industrial, municipal, commercial, mining and agricultural operations, and from community and institutional activities.

**Waste:** Any useless and valueless material that is to be discarded.

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### 5: Types of Hazardous Waste

An item is considered waste when the owner determines that the material is no longer useful and needs to be discarded. An item is considered to be hazardous waste if it meets one or more of the following characteristics:

- A chemical component is listed on one of the Chemical Tables included at the back of this chapter.
- Mixture contains a listed hazardous waste and a nonhazardous waste.
- One of the following:
  - Ignitability (flashpoint < 60º C or supports combustion)
  - Reactivity (e.g., water re actives, cyanides, explosives, unstable chemicals)
  - Corrosivity (ph < 4 or > 10)
  - EP toxicity (e.g., pesticides, heavy metals, poisons)

Individual departments are responsible for properly identifying the hazardous waste they generate and for following University disposal procedures. Refer to the Chemical Tables section in this chapter for list of regulated hazardous chemicals.
6. Containers, Tags, and Collection

Proper containment, tagging, collection and disposal are essential to the success of the Hazardous Waste Program. The following sections discuss these areas.

Filling Containers

Hazardous waste collection containers must be in good condition, must not leak, and must be compatible with their hazardous contents (e.g., do not use metal containers for corrosive waste or plastic containers for organic solvents). All containers must have suitable screw caps or other secure means of closure. When large waste containers (greater than 10 gallons total volume) are warranted, contact the Environmental Health & Safety Department for assistance.

If you are reusing a container to accumulate waste, destroy the original product label. EPA regulations require that waste containers be labelled with the accumulation start date, the identity of the contents, and the words "Hazardous Waste". Use a new label to identify the hazardous waste, do not use the disposal tag for this purpose.

**IMPORTANT:** Never overfill hazardous waste containers. Expansion and excess weight can lead to spills, explosion, and extensive environmental exposure.

Hazardous waste containers for liquids are generally rated by volume capacity. Allow extra room in liquid containers to allow for contents expansion.

- Do not fill jugs and bottles past the shoulder of the container. The shoulder of the container is the place where the container slopes in towards the neck.
- Fill closed head cans (5 gallons or less) to leave approximately two inches of space between the liquid level and the top of the container.
- Fill closed head drums (larger than 5 gallons) to leave approximately four inches of space.

Hazardous waste containers for solids are generally rated by their weight capacity and volume capacity. Take care not to exceed the weight capacity of a solid container. Weight is generally not a problem for jars and open head cans (5 gallons or less), but it can be a problem for open head drums (larger than 5 gallons). Depending on weight requirements, you may fill containers for solids within two inches of the closure.

**IMPORTANT:** Keep all waste collection containers closed except when adding or removing material.
7. Completing Tags

Note: The following description of the use of “Waste Tags” applies to the systems used for TAMU-HSC labs in College Station. All other Components should contact their safety office for information on their own program.

When a container is ready for disposal, complete a waste tag (available from the Environmental Health & Safety Department) and attach it to the container. A waste disposal tag must be attached to each waste container before disposal. A sample Chemical Waste Disposal Tag is included on the following page.

Follow these guidelines for completing hazardous waste tags:

• Completely fill out both the upper and lower sections of the tag. (This information is essential for record keeping.)
• The "REQUESTOR" is the person in charge of the lab.
• Use full chemical names or common names. Chemical formulas or abbreviations are not acceptable.
• List all chemical components in the waste container, including water. Long lists may be continued on the back of the tag.
• Indicate the percent concentration of potentially explosive materials such as picric acid and nitro compounds.
• Place additional hazard information in REMARKS.
• Attach the tag to a string which encircles the container. Rubber bands, tape, and wire are not acceptable.

(Attach Top Portion of tag to Container)

CHEMICAL WASTE DISPOSAL TAG

REQUESTOR: John Doe

DEPT/PART: Chemistry

PHONE: 5-3140 DATE: 7-18-94

CHEMICAL(S): Benzene

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CHEMICAL WASTE DISPOSAL TAG

DATE: 7-18-94

REQUESTOR: John Doe

DEPT/PART: Chemistry
BLDG. NAME & NO: Chemistry - 376
ROOM NO. 2002 PHONE: 5-3140
CHEMICAL(S): Benzene
  _LIQUID _SOLID _Pint _Gallon _5-Gallon Amount _Other 4 liters
CONTAINER TYPE:
  _Glass _Metal _Other
REACTS WITH:
  _None _Air _Water _Other Heat
HAZARDS:
  _Highly Flammable _Explosive _Carcinogen _Highly Toxic _Highly Corrosive
  _Other

REMARKS:

8. Collection and Disposal

Improper disposal methods for hazardous chemical waste include the following:

- Disposal down the drain.
- Intentional evaporation in a fume hood.
- Disposal in the regular trash.

9. Disposing of Empty Containers

What do I do with empty chemical containers? How do I get rid of them? Can they be placed in the trash dumpster? The answer is fairly simple but very important.

EPA regulations stipulate that empty containers must meet the following requirements:

- Containers must not contain free liquid or solid residue.
- Containers must be triple rinsed.
- Product labels must be defaced or removed.
- Container lids or caps must be removed.
Punch holes in the bottom of metal containers and plastic jugs before disposing of them in the regular trash. It is not necessary to break empty glass containers.

IMPORTANT: Containers that do meet the requirements mentioned here must be treated as hazardous waste.

10. Minimization and Substitution

The cost of commercial waste disposal continues to rise and the amount of waste generated continues to increase. TAMUS-HSC cannot control disposal costs, but it can reduce the amount of waste generated. The following sections discuss how to minimize waste sources and waste products.

11. Waste Source Reduction Techniques

Use the following techniques to reduce waste sources:

Purchasing and Inventory Control

- Use computerized tracking systems to manage purchasing and control inventory.
- Maintain current inventory records to prevent overstocking and to monitor the shelf life of remaining chemicals.
- Develop a campus-wide chemical exchange network to promote chemical sharing and avoid redundant purchases.
- Negotiate with suppliers to gain volume discounts, flexible delivery schedules, and delivery of fewer small-sized containers without cost penalties.
- Purchase quantities for immediate use only. Do not order quantities to obtain a special unit cost savings.
- Obtain compressed gases from vendors who accept return of empty or partially full cylinders.
- Include waste generation as a criteria in equipment selection.
- Rotate chemical stocks to use chemicals before their shelf-life expires.

Chemical Usage

- Use lab procedures that assure the integrity of chemical quality.
- Reduce spills and waste by pre-weighing chemicals for undergraduate use.
- Require proper labeling of all secondary containers. Replace all deteriorating labels on primary and secondary containers.
- Substitute less hazardous chemicals whenever possible (e.g., biodegradable scintillation cocktails instead of xylene or toluene-based cocktails).
12. Waste Minimization Techniques

Follow these techniques to reduce hazardous waste:

• Establish a Faculty Task Force to review waste streams and recommend waste minimization procedures.
• Do not mix different types of waste. Do not put non-hazardous waste, such as a mixture of water, sodium bicarbonate, and acetic acid, into a waste container of hazardous waste. Do not combine inorganic heavy metal waste with organic solvents waste. Segregate halogenated waste solvents from non-halogenated waste solvents.
• Segregate waste streams by storing them in separate waste containers. Store waste containers separate from reagent containers being used to avoid accidental contamination.
• Decontaminate empty containers to make them non-hazardous.
• Neutralize dilute acids and bases to make them non-hazardous and suitable for drain disposal.
• When possible, redesign experimental protocols so that harmful byproducts are detoxified or reduced.
• Recycle chemicals via purification.
• Make lab employees accountable for waste when labs are decommissioned.

13. Segregation

Segregated waste is safer and easier to dispose of than nonsegregated waste. Mixed waste, for example, must be handled as both radioactive waste and hazardous waste.

Each employee who generates waste is personally responsible for the following:

• Ensuring that hazardous wastes are accumulated in safe, transportable containers.
• Ensuring that hazardous wastes are stored properly to prevent possible exposure.

In addition to the guidelines for waste minimization and substitution, follow these guidelines for waste segregation:
• Segregate waste into the following groups:
  • Halogenated solvents
  • Non-halogenated solvents
  • Acids
  • Bases
  • Heavy metals
  • Poisons
  • Reactives

• Do not mix non-hazardous waste, such as water, with hazardous waste.
• Do not combine inorganic heavy metal waste with organic solvent waste in hazardous waste containers.
• Double-bag dry materials contaminated with chemicals (paper, rags, towels, gloves, or kim wipes, etc.) in heavy-duty plastic bags. **Do not use biohazard bags.** Dispose of these items in the same manner as hazardous waste.
• Encapsulate sharps (e.g., needles, razor blades, etc.) then place them in trash dumpsters.

14. Special Concerns

Employees who generate hazardous waste must maintain and control their hazardous waste accumulation areas. Special concerns for hazardous waste include the following:

• Unneeded chemicals that are to be discarded must be handled and managed as hazardous waste.
• Unknown chemical waste will be picked up by Environmental Health & Safety Department. Departments will be charged for the chemical analysis to determine proper disposal method.
• Gas cylinders are extremely difficult to discard. They should be returned to the manufacturer or distributor whenever possible. Cylinders that cannot be returned should be tagged as hazardous waste as soon as possible.
• Photographic chemicals containing silver may not be placed in the sanitary sewer. They must be disposed of as hazardous waste.

*NOTE:* Some developing equipment has a filter to capture silver before the photographic effluent enters the drain.
APPENDIX A - Chemical Tables

The following tables outline most regulated types of hazardous chemicals.