

V. Waste Identification

The first step in the management of hazardous waste is to determine whether a material is a waste. A waste is generally defined as a material, which is discarded, including materials that are either spent or intended to be thrown away. Materials that are being used for their intended purpose or are otherwise still reusable are not considered waste. A waste can be a solid, liquid, semisolid, or contained gas material.

The second step in the waste identification process is to determine if the waste is a hazardous waste. Waste generators are required to complete a *Waste Stream Determination Form* (located in *Appendix B* on page 28) for all wastes generated, even if the waste is not considered hazardous. The *Waste Stream Determination Form* is also located on the EHSRM website at: [http://www.sfasu.edu/safety/documents/Hazardous_Waste_Determinations_and_Documentation_Guidance_and_Form\(1\).pdf](http://www.sfasu.edu/safety/documents/Hazardous_Waste_Determinations_and_Documentation_Guidance_and_Form(1).pdf).

Completed copies of the *Waste Stream Determination Forms* should be forwarded to the EHSRM Department via campus mail SFA Box 6113, faxed to 468-7312, or emailed to safety@sfasu.edu.

A. Hazardous Chemical Wastes

The following information will help you determine if a waste is hazardous based on its characteristics and/or chemical makeup.

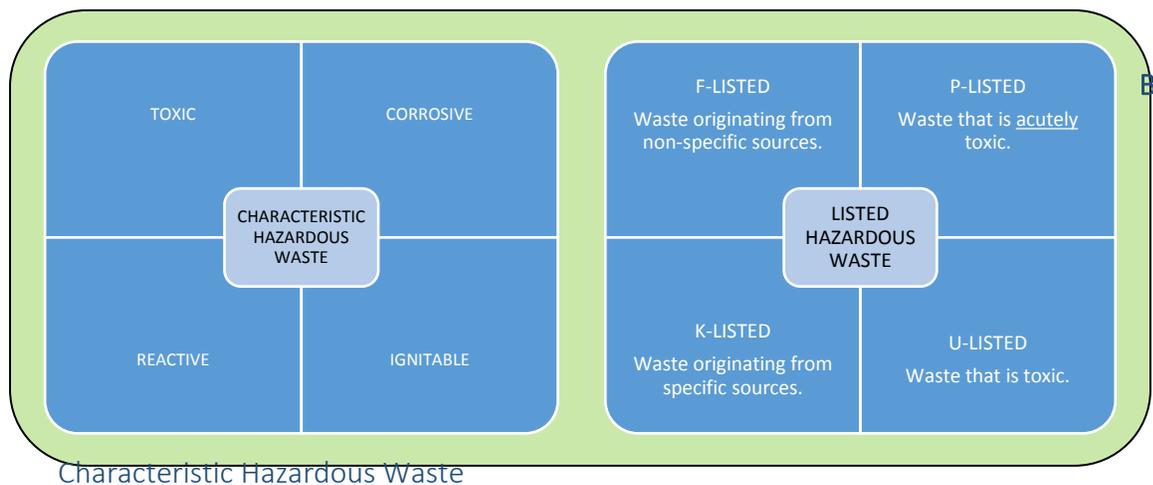
A hazardous chemical waste is defined by the EPA as a waste which, due to its quantity, concentration, or physical and chemical characteristics may:

- Cause, or significantly contribute to, an increase in mortality or an increase in serious illness; or
- Pose a substantial present or potential threat to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

The purpose of this section is to help you better understand exactly what is and is not a regulated hazardous chemical waste. In doing so, we hope that you may be able to design experiments with waste minimization in mind, and dispose of chemical waste generated in your laboratory in a manner consistent with legal requirements. The U.S. Environmental Protection Agency and the Texas Commission on Environmental Quality (TCEQ) regulate the treatment and disposal of chemical wastes in Texas.

According to federal and state regulations, each generator of chemical waste must first conduct a hazardous waste determination by using one of the methods described in the following sections (Characteristic Hazardous Waste, Listed Hazardous Waste, Class I Wastes, Universal Waste, Biological Waste, or Radioactive Waste). If assistance is needed to determine the hazardous nature of a waste, contact the EHSRM Department at 468-6034. Forward copies to EHSRM at SFA PO Box 6113, or Fax to 468-7312.

The Hazardous Waste Universe



The first method of determining if your waste is hazardous is by determining if it exhibits one of the following four characteristics described in detail below.

In the code of Federal Regulations (40 CFR 261.20 – 261.24), the Resource Conservation and Recovery Act (RCRA) defines the four fundamental characteristics of regulated waste as:



1. Ignitable:



- Any liquid waste or liquid waste mixture having a flashpoint of 140° F (60° C) or lower. Examples include most spent non-halogenated solvents such as methanol, ethanol, acetone, xylene, toluene, benzene, and gasoline.
- Any solid waste that is capable of causing fire through friction or absorption of moisture or can undergo spontaneous chemical change resulting in persistent burning. Solids such as sodium or potassium metals, solid naphthalene, and nitrocellulose also fall into this category.
- Flammable compressed gases, including those that form flammable mixtures with air.

- d) Oxidizers that stimulate combustion of organic materials.
- e) Ignitable wastes should always be isolated from ignition sources.
- f) Ignitable materials include most common organic solvents, gases such as hydrogen and hydrocarbons, and certain nitrate salts.

2. Toxic:



- a) Any waste which contains concentrations of certain constituents in excess of regulatory limits is a toxic hazardous waste.
- b) According to EPA, the 40 constituents that must be considered when evaluating a waste for potential toxic concentrations include six pesticides, eight heavy metals, and 26 solvents and other organics.

Pesticides	Metals	Organics	
Endrin	Arsenic	Chloroform	Methyl ethyl ketone
Lindane	Barium	o-Cresol	Nitrobenzene
Methoxychlor	Cadmium	m-Cresol	Pentachlorophenol
Toxaphene	Chromium	p-Cresol	Pyridine
2,4-D	Lead	Cresol (total)	Tetrachloroethylene
2,4,5 TP	Mercury	1,4-Dichlorobenzene	Benzene
Silvex	Selenium	1,2-Dichloroethane	Trichloroethylene
	Silver	1,1-Dichloroethylene	Carbon Tetrachloride
		2,4-Dinitrotoluene	2,4,5-Trichlorophenol
		Heptachlor	Chlordane
		Hexachlorobenzene	2,4,6-Trichlorophenol
		Hexachlorobutadiene	Chlorobenzene
		Heptachloroethane	Vinyl Chloride

- c) The levels at which these chemicals are regulated in mixtures varies from 0.2 ppm to 400 ppm. For example, solutions that contain mercury at levels above 0.2 ppm are hazardous waste. These levels are very low, so if a waste contains one or more of these components it should be considered a hazardous waste.

Note: Eight metals and other constituents listed here are regulated in both their pure forms and as compounds.

3. Corrosive:



- a) Any waste liquids or waste liquid mixture having a pH less than or equal to 2 or greater than or equal to 12.5. Examples include hydrochloric acid, phosphoric acid, sulfuric acid, sodium hydroxide, and corrosive cleaning agents.
- b) Liquid substances which corrode steel at a rate greater than 6.35 millimeters (0.250 inches) per year at a test temperature of 55°C (130° C).
- c) *Dilution of acids or bases with water is not an acceptable practice. Acids and bases can be neutralized as part of an experiment, but that process must be a written step in the experimental procedure.*
- d) In addition, liquids or liquid mixtures having a pH less than 5.5 or greater than 11.5 are not permitted to be disposed of via sink drains or other wastewater conveyances. Disposal of such liquids is specifically prohibited by the University's municipal wastewater discharge permit.

4. Reactive:



- a) Unstable materials capable of undergoing violent chemical change (without detonating).
- b) Materials which react violently with water.
- c) Materials which form potentially explosive mixtures with water.
- d) Materials which, when mixed with water, generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
- e) Cyanide or sulfide bearing wastes which, when exposed to pH conditions between 2 and 12.5, will generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
- f) Materials capable of detonation or explosive reaction when subjected to a strong initiating source or if heated in confinement.

- g) Materials which are capable of detonation or explosive decomposition at standard temperature and pressure.

C. Listed Hazardous Waste

Another method of determining if a waste is hazardous, is if one of more of the chemicals that make up the waste are identified on one of the categorized lists developed by the EPA.

The EPA has developed four lists of hazardous chemical waste described in the Resource Conservation and Recovery Act (40 CFR Part 261, Subpart D). The four lists of hazardous waste include the following which in total includes over 800 different substances.

F-Listed	P-Listed	U-Listed	K-Listed
<ul style="list-style-type: none"> Waste originating from non-specific sources. 	<ul style="list-style-type: none"> Waste that is <u>acutely</u> toxic. 	<ul style="list-style-type: none"> Waste that is toxic. 	<ul style="list-style-type: none"> Waste originating from specific sources.

The wastes regulated as listed chemical wastes are specifically listed in 40 CFR sections 261.31 (F list), 261.32 (K list), 261.33 (P and U lists). Refer to *Appendix C* on page 30 and *Appendix D* on page 36 for detailed lists of these wastes.

1. **F-Listed Waste**

The **F List** addresses wastes from nonspecific sources (e.g., spent solvents) and is broken down into several subcategories (or *codes*). Five codes that are commonly applicable to laboratory wastes are:

F001 Code — Applicable to all spent solvent mixtures and blends used for degreasing which contained, before use, a total of ten percent or more (by volume) of one or more of the following halogenated solvents:

tetrachloroethylene	trichloroethylene
methylene chloride	1,1,1-trichloroethane
carbon tetrachloride	chlorinated fluorocarbons

F002 Code — Applicable to all spent solvent mixtures and blends which contained, before use, a total of ten percent or more (by volume) of one or more of the following halogenated solvents:

tetrachloroethylene	methylene chloride
trichloroethylene	1,1,1-trichloroethane
chlorobenzene	1,1,2-trichloro-1,2,2-trifluoroethane

ortho-dichlorobenzene	trichlorofluoromethane
1,1,2-trichloroethane	

F003 Code — Applicable to all spent solvent mixtures and blends which contained, before use, a total of ten percent or more (by volume) of one or more of the following non-halogenated solvents:

xylene	acetone
ethyl acetate	ethyl benzene
ethyl ether	methyl isobutyl ketone
n-butyl alcohol	cyclohexanone
methanol	

F004 Code — Applicable to all spent solvent mixtures and blends which contained, before use, a total of ten percent or more (by volume) of one or more of the following non-halogenated solvents:

cresols and cresylic acid	nitrobenzene
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F005 Code — Applicable to all spent solvent mixtures and blends which contained, before use, a total of ten percent or more (by volume) of one or more of the following non-halogenated solvents:

toluene	methyl ethyl ketone
carbon disulfide	isobutanol
pyridine	benzene
2-ethoxyethanol	2-nitropropane

2. K-Listed Waste

The **K List** addresses waste from specific sources (e.g., pink/red water from TNT operations - K047) and is generally not applicable to wastes generated in teaching and research laboratories.

3. P-Listed Waste

The **P List** addresses unused *acutely hazardous materials* (e.g., laboratory chemicals having an LD₅₀ of less than 50 mg/kg (oral; rat)). It is applicable to many surplus chemicals that are disposed of by research laboratories. Some examples are nickel tetracarbonyl, phosphine, and osmium tetroxide. This list can be found in *Appendix C* on page 30.

4. U-Listed Waste

The **U List** addresses unused hazardous materials (e.g., toxic laboratory chemicals). Like the P list, this is applicable to many surplus chemicals that are disposed of by research laboratories. Some examples are aniline, benzene, and acetone. The U list can be found in *Appendix D* on page 36.

D. Class I Wastes

Waste generators should also be aware of Class I wastes. Wastes in this category are regulated by the TCEQ, are not considered hazardous by the EPA definition, but must be disposed of at a permitted landfill due to Texas regulations. Examples of wastes which fall under the Class I definition are soils contaminated with petroleum hydrocarbons, sandblasting sand with leachable lead concentrations between 1.5 and 5.0 ppm, used oil, and solids that when mixed with an equal weight of liquid form a corrosive solution. Class I wastes should also be managed and disposed of through the SFA Hazardous waste program to ensure proper disposal at a permitted landfill.

The following are the guidelines for categorizing Class I wastes:

1. Regulated asbestos containing material.
2. Materials containing specific toxic chemical constituents, which exceed regulated concentration levels, although not enough to be considered hazardous.
3. Liquids, which are ignitable at levels above 150 degrees F, or are solids and semi-solids and contain chemicals considered to be ignitable under certain conditions incidental to storage, disposal, or treatment.
4. Semi-solids and solids which when combined with water exhibit corrosive properties.
5. Empty containers, which held hazardous substances or a Class 1 waste, unless the residue has been completely removed by triple rinsing the container.
6. Waste containing more than 50 parts-per-million of total polychlorinated biphenyls (PCBs).
7. Waste associated with exploration, development and production of crude oil, natural gas or geothermal energy, which contain more than 1,500 parts per million total petroleum hydrocarbons (TPH).
8. All non-hazardous industrial solid waste generated outside Texas and transported into or through Texas for storage, processing or disposal.

E. Universal Waste

Federal and State agencies also regulate other wastes the University generates under less stringent guidelines set up to encourage recycling and reduce illegal disposal. The wastes falling under this category are noted as *Universal Wastes* and include batteries, spent fluorescent lamps (light bulbs), pesticides, and certain mercury-containing equipment. If you have questions concerning the proper handling, storage, and management of any of these wastes contact EHSRM at 468-6034.

Note: Universal Waste is still a hazardous waste with specific storage and disposal guidelines. Universal Waste is not allowed in the regular trash.

1. Batteries

All spent batteries containing lead, nickel, lithium, cadmium, or any other hazardous component are classified as Universal Wastes and must be recycled no matter what size. Standard Alkaline batteries are not regulated and may be disposed of in the regular trash.

2. Fluorescent Lamps

All spent fluorescent lamps, except those with green end caps; contain mercury in such amounts that they exhibit a hazardous waste toxicity characteristic. State and federal regulations allow them to be managed as a Universal Waste and must be recycled. However, if the lamps are broken during removal they must be labeled and managed as hazardous waste. In the event of a broken bulb, contact the Physical Plant or EHSRM. In addition, spent light ballasts also require special consideration because they may contain PCBs. Leaking ballast must be kept separate and placed in a leak proof container immediately. In the event of ballast malfunction or a leaking ballast, contact the Physical Plant.

3. Pesticides

Waste pesticides can also qualify as Universal Wastes if they have been recalled or come from stocks of unused products gathered as part of a waste pesticide collection program.

4. Mercury-Containing Equipment

This category includes devices, items, or articles that contain varying amounts of elemental mercury integral to its function. Some commonly recognized devices are thermostats, barometers, manometers, temperature and pressure gauges, and mercury switches such as light switches in automobiles.

5. Paint and Paint Related Waste

Under the Texas rule, the following paint and paint related waste may be managed as Universal Waste:

- a) Used or unused paint and paint-related material which is technically "hazardous waste" (oil based paints), and
- b) Any mixture of pigment and a suitable liquid that forms a closely adherent coating when spread on a surface or any material that results from painting activities.

F. Biological Waste

The Texas Department of State Health Services (TDSHS) has identified biological waste as waste that requires special handling to protect human health or the environment. Specific regulatory requirements apply to the proper handling and disposal of biological waste to prevent the potential spread of infectious diseases. Biological waste is regulated by the TCEQ and the TDSHS. For more information on proper handling and disposal of biological waste, see the SFA Biological Safety Manual located on the EHSRM website at: <http://www.sfasu.edu/safety/>.

Biological waste is comprised of the following:

1. Microbiological Waste

Microbiological waste includes:

- a) Discarded cultures and stocks of infectious agents and associated biologicals.
- b) Discarded cultures of specimens from medical, pathological, pharmaceutical, research, clinical, commercial, and industrial laboratories.
- c) Discarded live and attenuated vaccines, but excluding the empty containers thereof.
- d) Discarded, used disposable culture dishes.
- e) Discarded, used disposable devices used to transfer, inoculate, or mix cultures.

Note: In vitro tissue cultures that have not been intentionally exposed to pathogens are exempt from these regulations.

2. Animal Waste

Animal waste includes:

- a) Carcasses of animals.
- b) Body parts of animals.
- c) Whole blood, serum, plasma, and/or other blood components from animals.
- d) Bedding of animals intentionally exposed to pathogens.

3. Human Blood and Blood Products

Human blood and blood products include:

- a) Human blood, serum, plasma, other blood components, and body fluids.
- b) Disposable items contaminated with human blood or body fluids.

4. Pathological Waste

Pathological waste includes but is not limited to:

- a) Human materials removed during surgery, labor and delivery, autopsy, embalming, or biopsy, including: body parts and tissues or fetuses.
- b) Laboratory specimens of blood and tissue after completion of laboratory examination.
- c) Anatomical remains.

5. Sharps

Sharps include but are not limited to the following, **regardless of contamination**:

- a) Hypodermic needles.
- b) Hypodermic syringes with attached needles.
- c) Scalpel blades.

- d) Razor blades, disposable razors, and disposable scissors used in surgery or other medical procedures.
- e) Glass Pasteur pipettes.

Sharps include but are not limited to the following, **when contaminated**:

- a) Glass pipettes.
- b) Broken glassware.
- c) Specimen tubes;
- d) Blood culture bottles.
- e) Microscope slides.

Contaminated is defined as the presence or the reasonably anticipated presence of blood, body fluids, or other infectious materials.

G. Radioactive Waste

SFA currently does not have a license to use regulated radioactive materials. The following guidelines will be useful in the event that SFA obtains the proper license for the use of regulated radioactive materials on campus.

All radioactive waste generated by the use of radioactive materials at SFA shall be disposed of in such a way as to prevent the occurrence of a hazard to the health of university staff, students, faculty, and the general public. All users of radioactive materials must comply with the Texas Regulations for the Control of Radiation. Additional information on radioactive material waste management is covered in the SFA Radiation Safety Manual available on the EHSRM website at: <http://www.sfasu.edu/safety>.