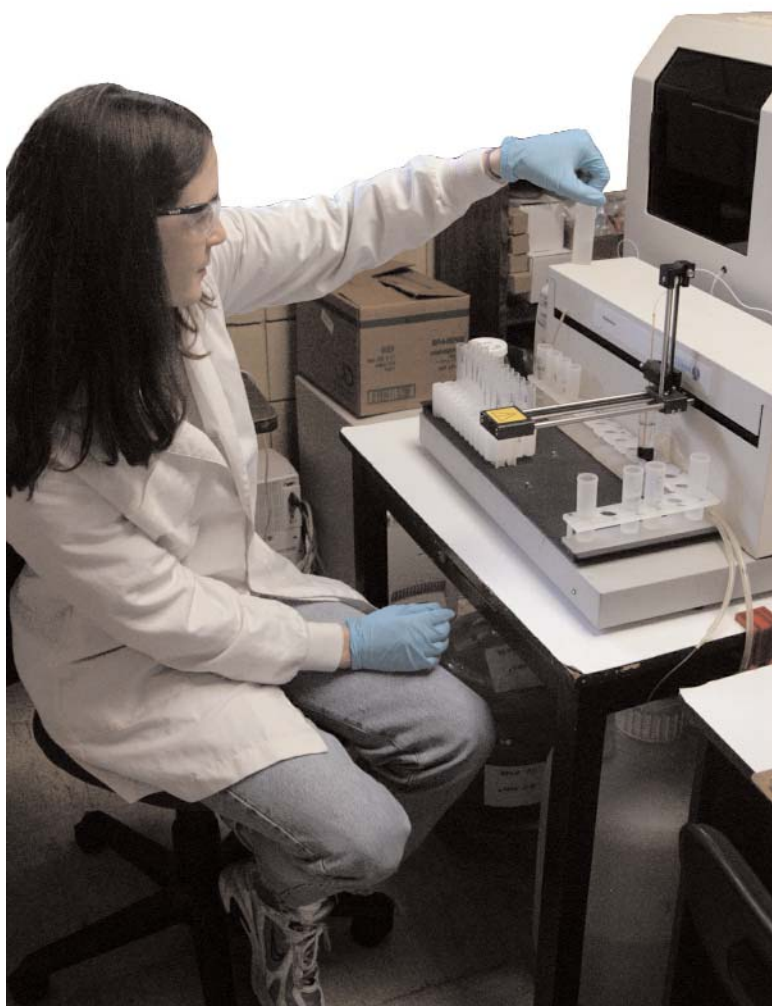


A Guide on Hazardous Waste Management for Florida's

Laboratories



Florida Department of Environmental Protection Hazardous Waste Compliance Assistance Program



This document was published to help educate businesses on hazardous waste management issues affecting them. The suggested options may help businesses to operate in an environmentally appropriate manner. Some of the options may go beyond what is required to remain in compliance with regulations. Business owners are responsible for obtaining complete information about applicable regulations. Misrepresentations or omissions by the Florida Department of Environmental Protection or the Florida Center for Solid and Hazardous Waste Management do not relieve any person from any requirement of federal regulations or Florida law.

With Support From:

David Struhs, FDEP Secretary
Alan Bedwell, FDEP Deputy Secretary
John Ruddell, FDEP Waste Division Director
Bill Hinkley, FDEP Bureau Chief, Solid and Hazardous Waste Section
U.S. Environmental Protection Agency, Region IV

Prepared by:

Florida Department of Environmental Protection, Hazardous Waste Compliance Assistance Program

Satish Kastury, Administrator
Janet Ashwood, RCRA Program Contract Manager
Mike Redig, Tallahassee
Glen Perrigan, Tallahassee
Charlie Goddard, Northwest District
Bill Kellenberger, Northwest District
Ashwin Patel, Northeast District
Pamela Green, Northeast District
John White, Central District
Lu Burson, Central District
Beth Knauss, Southwest District
Kathy Winston, Southeast District
Charles Emery, South District
Karen Bayly, South District

Florida Center for Solid and Hazardous Waste Management www.floridacenter.org

John Schert, Executive Director
Marcia Marwede, Coordinator of Research Programs
Rhonda Rogers, Sr. Information Specialist
Kimberly Stenger, Technical Editor

These regulations are available at many public libraries. In addition, the Florida Department of Environmental Protection and the United States Environmental Protection Agency have posted links to copies of these regulations on the agencies' Internet sites:

<http://www.dep.state.fl.us>
<http://www.epa.gov>

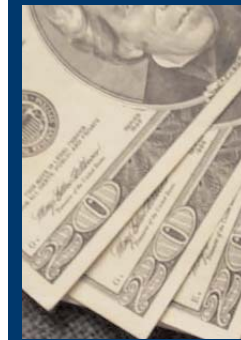
These sites also provide access to agency forms, fact sheets, checklists, rule summaries, answers to frequently asked questions and reports from our public information databases. Individuals who do not have Internet access may obtain copies of department publications through the contact information listed on page 17 of this document.

Revised June 2003

Why should I care about hazardous wastes?

As a business owner, operator or employee, you may be producing materials that can harm people and the environment. This booklet offers helpful tips on how to:

- Comply with federal and state hazardous waste regulations.
- Avoid penalties by properly managing hazardous wastes.
- Save money on disposal costs by reducing hazardous wastes.



Health and Environment

Hazardous wastes spilled or dumped on the ground or disposed in dumpsters may seep into the groundwater and contaminate drinking water supplies.

Hazardous wastes may run off into the nearest body of water where they may poison or kill fish and other wildlife.

Hazardous wastes pose a risk to you, your employees and your community.

Cost Savings

State and county inspectors may visit your business to ensure that hazardous wastes are being managed properly. State penalties range from \$100 to \$50,000 **per violation per day**.

Reducing hazardous wastes can reduce your production and disposal costs and reduce your risk of future liability.

Public Image

Your customers will appreciate your efforts to prevent pollution.

Your community will recognize your business as a good neighbor.

What is a hazardous waste?

A waste is hazardous if:

- It is listed as a hazardous waste in the Title 40 Code of Federal Regulations (CFR) Part 261, Subpart D.
- It has any of the characteristics described below:

Characteristic Wastes

Ignitable

Ignitable wastes are flammable or spontaneously combustible. If they have a flashpoint of less than 140 degrees Fahrenheit or an alcohol content of 24% or more, they are hazardous wastes. Examples include some alcohols and chromates (oxidizers).



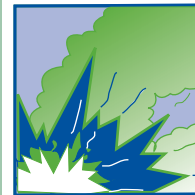
Corrosive

Corrosive wastes can burn the skin or corrode metals. Liquids with a pH of 2 or lower or 12.5 or higher are corrosive. Examples include strong acids and bases.



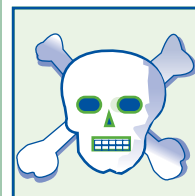
Reactive

Reactive wastes are unstable and may explode or react rapidly or violently with water or other materials. Examples include sulfides, cyanides and crystallized (dry) picric acid.



Toxic

Wastes are toxic if they contain certain heavy metals above specific concentrations, such as chromium, lead, mercury or cadmium, or toxic organic chemicals. Examples include benzene, trichloro-ethylene and tetrachloroethylene.



Listed Wastes

Some industrial processes and chemical wastes are listed specifically as hazardous in the federal regulations under 40 CFR 261, Subpart D. Copies of the rule can be found at many public libraries, on the internet (<http://www.access.gpo.gov/nara/cfr/>) or may be purchased from the Government Printing Office.

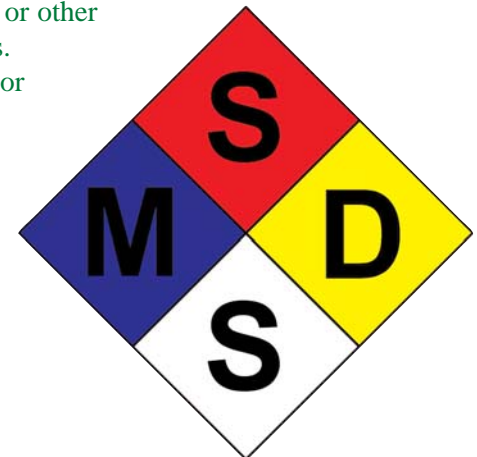
Acutely Hazardous Wastes

Small amounts of very dangerous wastes, such as arsenic and cyanide compounds, are regulated in the same way as large amounts of other wastes. A business that generates 2.2 pounds (1 kilogram) or more of these acutely hazardous wastes per month is subject to full regulation under the hazardous waste rules.

Identifying Your Hazardous Wastes

It is very important to determine whether a waste is hazardous or non-hazardous. There are several ways to identify hazardous wastes.

- Always ask for a Material Safety Data Sheet (MSDS) before ordering any new product. The MSDS will give you valuable information about the product. Note: the MSDS does not identify chemicals present in concentrations less than 1%, or 10,000 parts per million.
- Talk to product suppliers and manufacturers.
- Read product labels.
- Compare product and process information to hazardous waste characteristics and to wastes listed in federal regulations.
- If product or process information is not available or is inconclusive, have a commercial lab sample and test the waste using the TCLP test or other appropriate analytical tests.
- A non-hazardous material or product may become a hazardous waste due to contaminants added during use. Lab testing may be necessary.



Sources of Hazardous Waste

- **Spent solvents** used in cleaning, extraction and other processes.
- **Non-empty** solvent containers or aerosol cans.
- **Testing samples**, if they are not entirely consumed by the test procedure.
- **Unused reagents** that are no longer needed, do not meet specifications, are contaminated, have exceeded their storage life or are otherwise unusable in the lab.
- **Reaction products** of known or unknown composition. Try to identify reaction products and label them for proper disposal.
- **Absorbents** used to clean up hazardous wastes.
- **Contaminated materials** such as glassware, gloves, paper and plastic products.
- **Used chromatography vials.**
- **Gas cylinders.**
- **Mercury spills.**



Typical Hazardous Wastes

ACIDS/BASES (corrosive)

Acetic acid
 Ammonium hydroxide
 Hydrochloric acid
 (muriatic acid)
 Nitric acid
 Oleum
 Potassium hydroxide
 Sodium hydroxide
 Sulfuric acid

REACTIVES

Calcium metal
 Dry picric acid (should not
 be disposed of by
 untrained personnel)
 Potassium cyanide
 Potassium metal
 Sodium hydride
 Sodium sulfide
 Stannic chloride

OXIDIZERS (ignitable)

Ammonium chromate
 Chromium trioxide
 Lead chromate
 Manganese dioxide
 Potassium permanganate
 Silver nitrate
 Sodium bromate
 Sodium chromate

SOLVENTS (ignitable)

Acetone
 Benzene
 Ethanol
 Ethyl ether
 Formaldehyde (potential)
 Hexane
 Isopropanol
 Methanol
 Methylene chlorides
 Methyl ethyl ketone (MEK)
 Pentane
 Pyridine
 Tetrahydrofuran
 Toluene
 Xylene

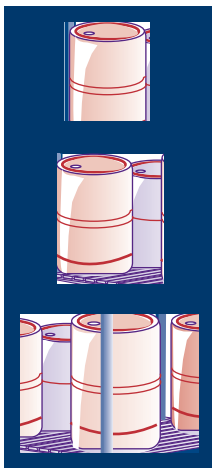
TOXICS

Acetaldehyde
 Allyl alcohol
 Barium
 Carbon disulfide
 Carbon tetrachloride
 Chloroform
 Chromium
 Hydrazine
 Lead
 Mercury
 Naphthalene
 Sodium azide



How should I manage hazardous wastes?

First, determine how much hazardous waste you generate **each month**. The rules you must follow depend on how much you generate, how much you store and how long you store it.



Less than 220 pounds (100 kilograms or about half a drum): you are a “Conditionally Exempt Small Quantity Generator” (CESQG).

220 - 2,200 pounds (100-1,000 kilograms or about half a drum to 5 drums): you are a “Small Quantity Generator” (SQG).

More than 2,200 pounds (1,000 kilograms or more than about 5 drums): you are a “Large Quantity Generator” (LQG).

The following practices may be required for your business. Even if they are not required, they are good waste management practices. Additional information is available from FDEP.

Containers

- Maintain containers in good condition. Prevent leaks, ruptures and accumulation of rainwater on tops of drums.
- If a container leaks, transfer waste to a new container.
- Keep containers closed. Use self-closing funnels when adding waste. Do not allow wastes to evaporate; this is a serious offense.
- Wastes must be compatible with the container. For example, use HDPE plastic containers for corrosive wastes.
- Never place incompatible wastes, such as wastes that react with each other (e.g., acids and bases), in the same container.

Storage

- Maintain adequate aisle space between container rows to allow inspection for leaks and damages.
- Store ignitable and reactive wastes at least 50 feet from property boundaries.
- Store containers with incompatible wastes in separate areas.
- Time limit for SQGs is 180 days and 90 days for LQGs.

Labels



- The above label represents proper wording for a hazardous waste label. You must also comply with FDOT.
- Label every container with the type of waste and whether it is hazardous or non-hazardous.
- Include the accumulation start date (the date when waste was first placed in the container).
- Include your laboratory name and address.
- Include federal waste code numbers.

Transport and Disposal

- Make sure your transport and disposal facility have US EPA identification numbers.
- Use manifests for all hazardous wastes shipped off-site. Keep the manifests on-site.

Inspections and Recordkeeping

- Inspect containers at least once a week and keep a written log of container inspections.
- Keep a record of larger spills and use this information to identify the spill prevention options that might help your lab.
- Keep training and inspection records for three years.
- Keep manifests and shipping receipts for three years.
- Keep records of lab tests for three years.
- Keep land disposal restriction forms for three years from the date the waste was last shipped.

Training

- Train all personnel to identify, reduce and properly handle wastes.
- Train new employees before they handle hazardous wastes.
- Inform employees of the importance of pollution prevention.

How can I reduce hazardous wastes?

Reducing hazardous wastes makes good business sense. Benefits include:

- Saving money on waste management costs.
- Reducing concerns about penalties and liability.
- Creating a safer, healthier workplace.
- Promoting positive public relations with clients, customers and the local community.

How do I begin?



- Make a commitment to reducing wastes in every area of your laboratory's operations.
- Evaluate your laboratory's wastes and identify areas where changes can be made.
- Encourage the participation of all laboratory personnel through education, training and incentives.

Purchasing

- Save money by ordering smaller quantities of chemicals and reducing the need to dispose of excess chemicals.
- Purchase smaller packages of chemicals to reduce storage requirements and reduce the risk of breakage and accidents.
- Purchase gas cylinders from vendors who will take back the empty cylinders.
- Purchase chemicals from suppliers who will take back unopened chemicals.
- Purchase supplies from vendors who promote small quantity purchases and who will accept returns of unopened bottles.



Inventory



- Use older chemicals first.
- Use the chemicals in the stockroom first before ordering new products.
- Label all chemicals with date of manufacture.
- Create an effective inventory system to reduce waste.
- After inventory is reduced, prevent accumulation of new inventory.
- If a constant stock is required, perform an inventory review at least once a year.

Laboratory

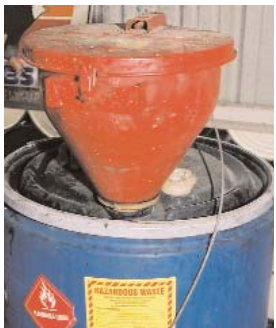
- Do microscale experiments using smaller vessels and smaller amounts of chemicals.
- Do one-pot reactions where one reaction's product(s) can be the starting point for another reaction.
- Use water-based solvents.
- Perform in-lab treatment of waste including neutralization, separation, fixation, oxidation, precipitation, degradation or ion exchange.
- Reuse acid mixtures for electroplating.



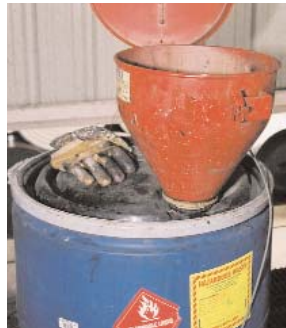
Cleanup

- Use detergents and hot water instead of chromic acid solutions to clean.
- Recover noble metals such as silver and palladium and heavy metals such as mercury.
- If possible, convert waste to product for another reaction.
- Train all personnel to use smaller amounts of chemicals and to properly dispose of waste.

Dos and Don'ts



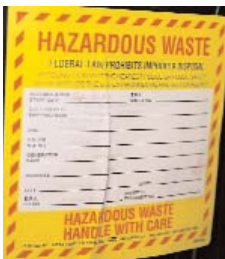
DO
Keep containers closed



DON'T
Leave containers open



DO
Keep accurate inspection logs



DO
Label all containers



DON'T
Leave containers unlabeled

Who needs to know if my laboratory generates hazardous waste?

Post Emergency Information

Post the following information near every telephone:

- * Fire department phone number.
- * Emergency coordinator's name and phone number.
- * Locations of fire alarms and extinguishers.
- * Locations of spill control materials.

Notify FDEP

If your laboratory is a small or large quantity generator, notify FDEP to obtain a US EPA identification number. Local environmental agencies also should be notified.

Notify local authorities

Police and fire departments and local hospitals that would respond to an emergency need to know that there are hazardous wastes on your property.

Designate an emergency coordinator

This person must know what to do in case of fire, spill or other emergency and must be on the premises or on call 24 hours a day.

Develop a contingency plan

Guidance on contingency plans is available from FDEP. Large quantity generators must have a written plan that includes:

- * Emergency response arrangements with police and fire departments, hospitals and emergency response contractors.
- * Emergency coordinator's address and phone number.
- * On-site emergency equipment descriptions and locations.
- * Evacuation plan and routes, including a site diagram.
- * Spill reporting procedures.

Smaller generators (SQGs and CESQGs) also should have a contingency plan.

Tips from Inspectors

Drums



- You cannot have any mystery drums. All drums must be labeled and have a “birthdate” on them.

- Evaporation of hazardous waste is a serious violation. Do not allow the hazardous wastes to

evaporate. When you are not in the process of putting waste into the drum, you must keep it closed.

- You also are required to keep the top of the drum clean.
- Do not store old drums outside. If they get stormwater inside them, you will have to sample the stormwater and determine whether the water in the drum is hazardous. Insist that the person who sold you the drum and its contents takes the drum back when you are done with it.

- Inspectors go into dumpsters and walk the entire property line of a business. They go back into trees looking for orphan drums and distressed/dead vegetation.



Spills

- Clean up your spills at the time of the spill.

Transport

- The only generators who are allowed to transport their own waste are conditionally exempt small quantity generators. All other generators must use a hazardous waste hauler that has a permit from the FDEP and the US EPA.

Waste

- The most common violation is the non-determination of whether something is a waste.
- Abandoned products are wastes.
- If you throw away containers, make sure the container is completely empty and rinsed before you place it in a waste receptacle. If you throw away aerosol cans, make sure the can has a hole in it, and that you have drained the liquids out of the can. If you are throwing away paint containers, be sure to drain all the paint out of the container.

Water

- If you discharge any waste that could be construed as a hazardous waste into a city sewer, you must have the written permission of the city sewer system. The city sewer system must be a Publicly Owned Treatment Works (POTW). It cannot be a privately owned package plant.
- If you use rags, you should send the rags to a linen service that is served by a publicly-owned sewage treatment plant. If you use paper towels, you must make a determination as to whether the used paper towels are a hazardous waste.
- Know where your drains go. All drains that lead from a hazardous materials area to a stormwater area should be sealed shut.



Checklist

This checklist will help you prevent the most common hazardous waste violations. For more detailed information on hazardous waste management requirements, contact FDEP.

- Each month, identify and record types and quantities of hazardous waste.
- Notify FDEP and obtain a US EPA identification number.
- Use proper containers to collect and store wastes.
- Label all containers, whether product or waste, as to their contents.
- Include accumulation start dates on labels.
- Keep all containers of hazardous waste or products containing regulated solvents closed at all times unless actively removing from or adding to them.
- Maintain aisle space between containers for inspection.
- Inspect containers weekly for rust, leaks or damage and keep a log.
- Train employees to properly handle hazardous wastes.
- Designate an emergency coordinator.
- Post emergency information near each phone.
- Develop a contingency plan for emergencies.
- Use manifests for all waste transported for disposal.
- Keep all records for at least three years.



Where can I get more information?

Additional information on hazardous waste reduction and regulations is available from many sources.

Florida Department of Environmental Protection

District offices and the Tallahassee office offer technical assistance, fact sheets and other publications on hazardous waste regulations.

Hazardous Waste Compliance
Assistance Program

Phone: (800) 741-4DEP

(850) 245-8707

Fax: (850) 245-8810



Available publications include:

- Summary of Hazardous Waste Regulations
- Requirements for Conditionally Exempt Small Quantity Generators
- Requirements for Small Quantity Generators
- Handbook for Small Quantity Generators of Hazardous Waste

U.S. Environmental Protection Agency

The US EPA has published a series of industry-specific guidelines and handbooks on preventing pollution and complying with hazardous waste regulations.

RCRA Hotline: (800) 424-9346

Your Trade Associations

Many trade associations have published guides to help you find solutions to your hazardous waste management problems.

Florida Small Business Assistance Program



The Small Business Assistance Program helps businesses with environmental concerns and problems related to compliance with air regulations. Assistance is confidential and staff experts have business experience.

Phone: (800) 722-7457

Offices of the Florida Department of Environmental Protection



Hazardous Waste Regulation Section
 Twin Towers Office Building
 2600 Blair Stone Road
 Tallahassee, FL 32399-2400
 (800) 741-4DEP

Northeast District
 7825 Baymeadows Way, Suite 200B
 Jacksonville, FL 32256
 (904) 807-3300

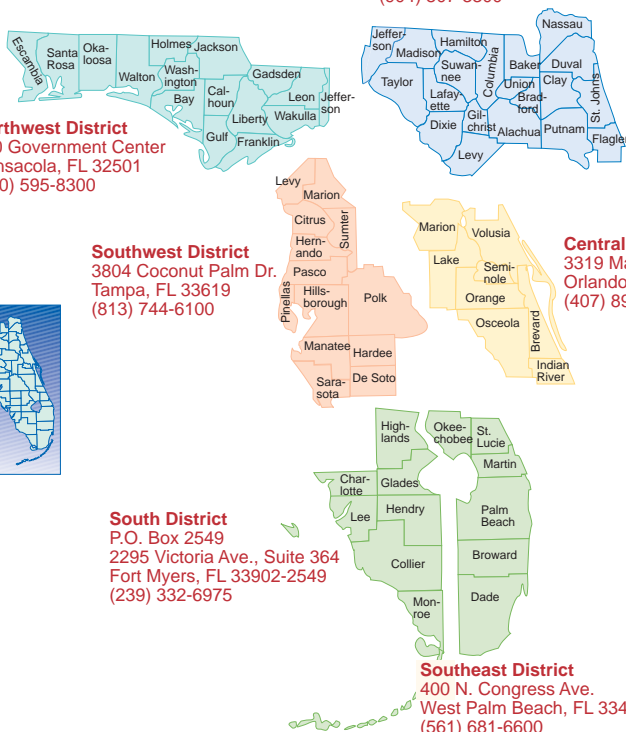
Northwest District
 160 Government Center
 Pensacola, FL 32501
 (850) 595-8300

Southwest District
 3804 Coconut Palm Dr.
 Tampa, FL 33619
 (813) 744-6100

Central District
 3319 Maguire Blvd.
 Orlando, FL 32803
 (407) 894-7555

South District
 P.O. Box 2549
 2295 Victoria Ave., Suite 364
 Fort Myers, FL 33902-2549
 (239) 332-6975

Southeast District
 400 N. Congress Ave.
 West Palm Beach, FL 33401
 (561) 681-6600



This project and the preparation of this booklet were funded in part by a Section 3011 Hazardous Waste Management State Program grant from the U.S. Environmental Protection Agency (US EPA) through a contract with the Hazardous Waste Management Section of the Florida Department of Environmental Protection. The total cost of the project was \$45,000, of which \$45,000 or 100 percent was provided by the US EPA.

University of Florida
**Florida Center for Solid and
Hazardous Waste Management**
2207-D N.W. 13th Street
Gainesville, FL 32609
(352) 392-6264
Fax: (352) 846-0183

Nonprofit Org
U.S. POSTAGE
PAID
Gainesville, FL
Permit No. 94

For additional information contact:
Janet Ashwood

Florida Department of Environmental Protection
Hazardous Waste Compliance Assistance Program
Tallahassee, FL
Phone: (800) 741-4337
(850) 245-8707