LABORATORY WASTE MANAGEMENT

Department of Environmental Protection
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CHAPTER 1: Laws and Regulations

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This chapter provides an overview of the federal agencies and laws that affect laboratory operations. Some of the relevant federal agencies and the legislative mandates under their jurisdiction that are applicable to the laboratories are as follow:

1. Department of Transportation (DOT) and its Research and Special Programs Administration (RSPA) **49 CFR 172 -173**
   * Hazardous Materials Transportation Act-governs the offering for transport and receipt of hazardous materials
   * HM-181- implements an international agreement regulating hazardous transportation

2. Department of Labor (DOL) and its Occupational Safety and Health Administration (OSHA) **29 CFR Part 1910**
   * Occupational Safety and Health Act- governs workplace safety.

3. Environmental Protection Agency (EPA) **40 CFR**
   * Clean Air Act (CAA) - governs emissions to the air

   * Clean Water Act (CWA) - regulates discharges into sewer or bodies of water

   * Solid Waste Disposal Act., as amended by the Resource Conservation and Recovery Act (RCRA) and its amendment, the Hazardous and Solid Waste Amendments (HSWA) - governs waste minimization, generation, management, shipment, storage, treatment, disposal, and export, as well as cleanup of hazardous waste still operation

   * Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as "Superfund" - governs cleanup of former hazardous waste sites; the Superfund Amendments and Reauthorization Act (SARA)- requires reporting of releases greater than specified quantities into the environment. Title III of SARA, called EPCRA (the Emergency Planning and Community Right to Know Act) requires reporting of the storage quantities of certain chemicals to emergency planning committees and other government bodies.

   * Toxic Substances Control Act (TSCA)- regulates the import and export of chemicals; also governs disposal of PCBs (polychlorinated biphenyl) and asbestos.

Statutory and Regulatory Programs (40 CFR) 260 – 262.

RCRA is the key law dealing with hazardous waste generation, management, and disposal- from "cradle to grave". The principal RCRA hazardous waste provisions are contained in Subtitle C of the Solid Waste Disposal Act (SWDA) The legal responsibilities under RCRA begin with and never terminate for the generator of the waste.

As with other environmental laws, there are provisions within RCRA that require regular reauthorization of authority by Congress. These reauthorization requirements represent

an opportunity for substantive changes to the legislation. The 1990s are expected to bring increased emphasis in these laws on waste minimization, source reduction, and reporting.

An important part of the RCRA law is the prohibition on the land disposal of many types of untreated hazardous waste. These prohibitions, known less formally as "the land-ban rules", have significantly altered hazardous waste disposal practices.

Violations

Violations of laws and regulations can be expensive in terms of personal injuries, lost time, production down time, regulatory fines, and negative publicity.

Legal action can take place against all levels of organizational responsibility from the chief executive officer (CEO) to supervising scientist. Further, it is not always necessary for enforcement agencies to show that a particular individual in an organization knew that a violation was taking place. Often the basis for legal action is that certain persons have known, because of their positions in the organization.

Violation of transportation, treatment, storage, or disposal requirements

Penalty type: Administrative or civil: up to $25,000 per day while violation continues

Knowing transport of hazardous waste to an unpermitted facility; treatment, storage, or disposal of hazardous waste without RCRA permit; destruction, alteration, or concealment of required records; transporting waste without a manifest

Criminal: up to 5 years imprisonment and/or $50,000 per each day of violation; penalties for repeat offenders are doubled

Knowing endangerment of another person through improper handling of hazardous waste

Criminal: up to 15 years imprisonment and/or $250,000 fine ($1,000,000 for organization)

Chapter 2: Generator's Responsibilities

This chapter discusses the laboratory waste management responsibilities and the commitment to safe and legal practices.

Management Responsibilities

Management must show commitment to the waste disposal programs by developing policies and guidance. To accomplish this, management must allocate resources for personnel, space and equipment, training, and any other requirements that allow the program to operate effectively.

Obligations

1. Establish a policy to protect health and environment.
2. Provide adequate budget for hazardous waste management and disposal.
3. Delegate authority to the hazardous waste coordinator who will be responsible for coordinating compliance activities.
4. Require that employees be trained in hazardous waste management.

Obtaining an EPA Waste Generator ID Number

The regulations generally require that generators of hazardous waste must obtain an EPA waste generator identification (ID) number. To obtain a waste generator ID number, use EPA's "Notification of Hazardous Waste Activity" (Form 8700-12). For more information, please contact the Florida Department of Environmental Protection, Hazardous Waste Section.

The current Bureau of Labs US EPA waste generator ID number is FLD984249987.

Generator Classification

EPA divides hazardous waste generators into three general categories: the conditionally exempt small-quantity generator (CESQG), the small quantity generator (SQG), and the large quantity generator (LQG)

Conditionally Exempt Small Quantity Generators

Produces less than 220 lbs/month
Produces less than 2.2 lbs/month of acute waste (listed as P waste)
Never accumulate > 2220 lbs
No storage time limit under 2200 lbs

Small Quantity Generators (SQGs)

Produces between 200-2200 lb/month
Generate less than 2.2 lbs/month of acutely hazardous waste
Storage time limit of 180 days

Large Quantity Generators (LQGs)

Produces more than 2200lbs/month
Produces more than 2.2 lbs/month of acute hazardous waste
Storage time limit of 90 days

The most significant difference in control between a large-quantity generator and a small-quantity generator is in the amount of time that such wastes may be accumulated on-site without a permit.

Reporting Requirements

Reporting requirements for waste generators fall into three general categories:

(1) The biennial report
(2) Immediate reporting of releases to the environment above specified quantities
(3) Reporting of quantities of chemicals stored on-site above specified amounts.

Reportable Quantities

The hazardous substances and their reportable quantities can be found in 40 CFR 302.4 (7-1-92 Edition). Many chemicals are used by laboratories at the 1 and 10 pound levels and are certainly within the realm of opportunity for a reportable release resulting from laboratory incidents.

Title III of SARA, the Emergency Planning and Community Right-to-Know Act (EPCRA), is particularly significant because it requires the establishment of state and local planning committees, emergency response plans, training, and annual notification of

releases. Laboratory must be aware of their responsibilities under Title III and comply with them.

Training of Laboratory Workers

RCRA, SARA (Title III of Superfund), and OSHA all have specific training requirements that may apply to laboratory workers who could be exposed to hazardous material. Personnel at the facility must successfully complete all safety training that is given by the training staff. The training program must

* be directed by a person trained in hazardous waste management procedures
* be designed to ensure that personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

CHAPTER 3: Identification and Characterization of Wastes

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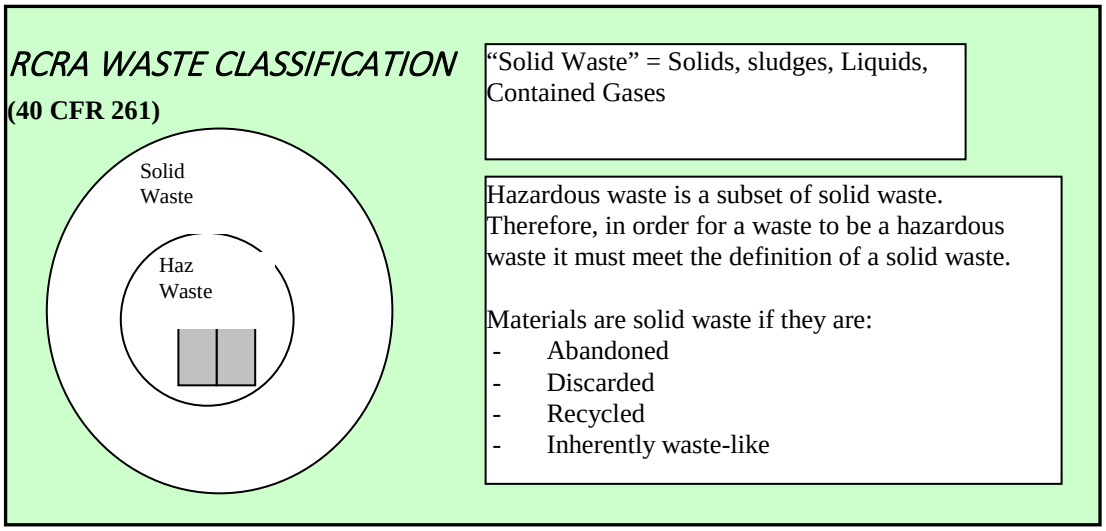
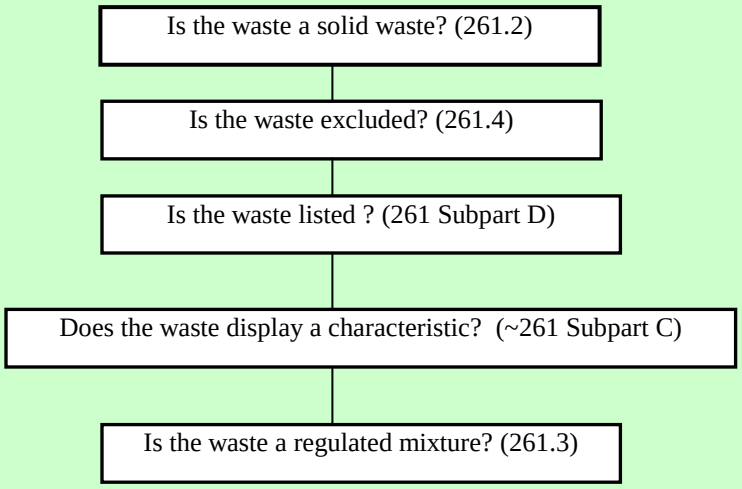
DEFINITION AND CLASSIFICATION OF HAZARDOUS WASTE

Hazardous wastes, by definition, are those solid wastes that either meet a specific hazard characteristic (waste exhibits ignitable, corrosive, reactive, or toxic) or are included on one of a number of EPA-promulgated lists(listed wastes). For listed wastes, EPA already has made the determination that the material is hazardous; for characteristic wastes, the responsibility falls on the generator, who (either by knowledge of the waste or by testing it) must evaluate the solid waste to determine if is hazardous. Listed hazardous wastes that are commonly generated by laboratory operations include spent solvents and certain reagents chemicals that are listed on EPA' P and U list of discarded commercial chemical products.



Section of 40 CFR 261 on Identification and Classification of Waste

To determine if a waste is a hazardous waste, you must ask a series of questions.



Hazardous Waste Exclusions (40 CFR 261.4)

Analytical Samples

* stored in lab before testing
* transported back to collector
* stored after testing for specific purpose or before return to collector

EPA's Hazardous Waste Designation System

The list of hazardous wastes includes spent halogenated and nonhalogenated solvents; electroplating baths; wastewater treatment sludges from many individual production processes; and heavy ends, light ends, bottom tars, and side-cuts from various distillation processes.

Some commercial chemical products are also listed as being hazardous waste when discarded. These include "acutely hazardous" wastes such as arsenic acid, cyanides, and many pesticides, as well as "toxic" wastes such as benzene, toluene, urethane, and phenols.
EPA has designated five categories considered as hazardous:

1. Specific types of wastes form nonspecific sources: examples include halogenated solvents, non-halogenated solvents, electro-plating sludges, and cyanide solutions from plating batches.

2. Specific types of waste from specific sources: examples include oven residue from the production of chrome oxide green segments and brine purification muds from the mercury cell process in chrome production where separated, prepurified brine is not used.

3. Specific substances identified as acute hazardous waste: examples include potassium silver cyanide, toxaphene, and arsenic oxide. (There are approximately 200 compounds in this category.)

4. Specific substances identified as hazardous wastes: examples include xylene, DDT, and carbon tetracloride. (There are approximately 745 compounds in this category.)

5. Characteristic wastes: wastes not specifically identified elsewhere that exhibit properties of ignitability, corrosivity, reactivity, or toxicity.

Ignitability

A solid waste is said to exhibit the characteristic of ignitability if a representative sample of the waste has any of the following properties:

1. It is a liquid, other than an aqueous solution, containing less than 24 percent alcohol by volume, and has a flashpoint less than 60C.
2. 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.
3. It is an ignitable, compressed gas.
4. It is an oxidizer.

Corrosivity

A solid waste is said to exhibit the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

1. It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5.
2. It is a liquid that corrodes steel at a rate greater than 6.35 mm per year at a test temperature of 55C.

Reactivity

A solid waste is said to exhibit the characteristic of reactivity if a representative sample of the waste has any of the following properties:

1. It is normally unstable and readily undergoes violent change without detonating.
2. It reacts violently with water.
3. It forms potentially explosive mixtures with water.

4. When mixed with water, it generates toxic gases, vapor, or fumes in a quantity sufficient to present a danger to human health or the environment.
5. It is a cyanide or sulfide-bearing waste that, when exposed to pH 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.
6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
7. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
9. It is a forbidden explosive, as defined in Department of Transportation regulations (49 CFR 173.51, 173.53, and 173.99)

Toxicity

A solid waste is determined to be toxic by the Toxicity Characteristics Leaching Procedure (TCLP), which is designed to identify wastes likely to leach hazardous concentrations of particular toxic constituents into the surrounding soils or groundwater as a result of improper disposal.
The procedure extracts constituents from the tested waste in a manner designed to simulate the leaching actions that occur in landfills. The extract is then analyzed to determine if it possesses any of the toxic contaminants listed in Appendix C. If the concentrations of the toxic constituents exceed the levels listed in the table, the waste is classified as hazardous.

LABORATORY WASTE DISPOSAL PRACTICES

Disposal of all laboratory chemical wastes must be done in a manner which maximizes personnel and protection and minimizes the risk of adverse effects. All disposal practices must comply with appropriate safety, health, and environmental regulations. Every effort should be made to minimize the amount of chemical wastes requiring disposal.
Laboratory wastes may be disposed of in the following ways: disposal through sanitary sewer; disposal at a sanitary landfill; or disposal by commercial hazardous waste company. The method of disposal is dependent upon:

1. Nature of the wastes.
2. Hazard potential of the waste.
3. Amount of the waste.
4. Availability of acceptable waste disposal method.

A. Disposal through sanitary sewer

1. Only non-hazardous, water soluble materials may be flushed into the sewer system.
2. Only small volumes of diluted waste should be disposed of this manner.
3. Acceptable wastes:

a. Acids or corrosive materials (diluted or concentrated reagent acids).
   1. Flush to the sewers with a 50:1 dilution with water.
   2. Flush sink with tap water after disposal to ensure that the traps contain no residual acid.

b. Non-hazardous digested sample (Acidified with acid)
   1. Flush to the sewers with a 50:1 dilution with water.
   2. Flush sink with tap after disposal to ensure that the traps contain no residual acid.

c. Non-toxic waste soluble solvents (acetone, ethanol)
   1. Unavoidable small amounts (< 10 ml) may be flushed with 50:1 dilution with water.
   2. Large quantities (especially acetone) should be disposed of in appropriate solvent waste bottles.

d. Non-hazardous aqueous samples (purgeables, organics and metal samples)
   1. Flush sink with tap water after disposal to ensure that the traps contain no residuals from the samples.
   2. Such samples should be disposed of in the hood sinks.

NOTE: HAZARDOUS WASTES CANNOT BE TREATED (EVAPORATED, DILUTED OR MIXED WITH OTHER CHEMICALS) FOR THE PURPOSE TO ALTERING THE CHARACTERISTICS OR CONCENTRATION FOR DISPOSAL.

B. Disposal through a solid waste facility

The following may be disposed of in wastepaper baskets or in the dumpster:

a. Non-hazardous solid samples (sediments, solid, etc.)

b. Broken glass-glassware must be containerized in a heavy cardboard box, taped securely closed and clearly marked as "broken glass".

c. Towels, foils, etc. not used in handling hazardous samples.

d. Samples which have been used for dry weight determinations. (if the samples have been found to be non-hazardous).

e. Solid samples which have been extracted or digested.
   1. Note: This assumes that all components have been extracted from the sample. If the sample contains significantly high quantities of any component, the extracted sample should be considered hazardous and treated accordingly.

f. Sample containers which contained non-hazardous samples, or which were appropriately treated to remove hazardous components.

NOTE: All processing materials (filters, towels, foils, etc) come in contact with listed chemicals (methylene chloride, benzene and pyridine) during sample processing should be treated as hazardous waste.

C. Disposal via a hazardous waste disposal contractor

All wastes, which are disposed of in this manner, must be clearly documented. Wastes should be grouped into these general categories:

a. Spent (NON-Chlorinated) flammable solvents to include:

1. Acetone
2. Hexane
3. Methanol
4. Toluene
5. Xylenes
6. Benzene
7. Iso-Octane
8. Iso-Propanol
9. n-propanol
10. Acetonitrile

b. Flammable solvents with sample extracts and organic standards

c. Spent Chlorinated Solvents include:

1. Methylene Chloride Waste

d. Metals wastes to include:

1. Sediment and tissue digestates, water digestates with significant metal content (especially silver and mercury).

2. Water samples which have been preserved with acid and which contain high level of toxic metals.

e. PCB Wastes

1. PCB solvent wastes to contain:
   a. Solvents used in extracting and cleaning sample and equipment known to contain PCB's.
   b. Sample extracts containing PCB's.

c. Acid used in the extractions of PCB's. (Note: As much acid as possible should be separated from the sample. This may be disposed of via the sanitary sewer with large amounts of water.)

2. PCB liquid wastes to contain:
   a. Aqueous samples containing PCB's.

3. PCB solid wastes to contain:

   a. Samples known to contain PCB's. (Note: The type of PCB and the concentration must be documented.)

   b. All solid wastes (foil, towels, contaminated glassware etc.) used in extracting PCB samples.

f. Cyanide wastes- Samples (aqueous and solid) known to contain cyanide.

1. Cyanide concentration must be clearly marked on the container.

2. If the sample is a water sample which was preserved with sodium hydroxide, the added notation of "CAUSTIC-pH >10" must be added to the container.

g. Potential Dioxin Wastes

To include:
1. All samples, extracts, standards, etc. containing these compounds:
   a. Tri-, Tetra-, and Pentachlorophenol
   b. 2,4,5-T
   c. 2,4,5-TP (Silvex)

h. Aqueous liquid wastes (primarily water samples, which contain no preserving agents).

i. Sediment and soil samples.

DOCUMENTATION

Flagging Hazardous Samples in the LIMS (Managers Only)

The decision to retain samples as hazardous is the responsibility of the supervisors and the section administrator. Once the decision has been made, these steps shall be followed:

Check to see if the sample was submitted for any other analyses (metal, purgeables, organics, etc.)

Place a message "HAZ" in the LIMS to indicate that the sample is hazardous. Below "HAZ", please identify if the sample is in one of these categories.

Petroleum Hydrocarbon
PCB
Metals
Mercury
Pesticides or Herbicides
Fuel
Cyanide

Place a note in each project file stating that the sample is hazardous and include a list
` of the components and concentrations of each components.

Disposing of the samples

The person(s) responsible for disposing of the samples will:

1. Check the LIMS to determine that all hazardous samples have been identified.
2. Check the project file for information concerning the contents of the sample and any special sample disposal instructions.
3. Place the hazardous samples in a box designated for hazardous waste.
4. Add a label on the outside of the box that describes the contents of the hazardous waste.
5. Transport the hazardous waste to the waste room

Sample extracts

All sample extracts should be disposed of in appropriate waste bottles:

Blank field blanks, and samples with no components identified in either the base-neutral/acid or pesticide extraction may be discarded into a solvent waste bottle.

Samples having any components should be discarded in a glass bottle identified for sample wastes. The documentation on the waste bottle shall list the following:

1. The extract solvent
2. The components in the sample
3. In general the statement " Contain less than 0.1% of any component" should separately with an approximate.

Extracts containing the following components must be isolated and disposed of in the appropriately identified containers:

1. Tr1, Tetr- and Pentachlorophenol
2. 2,4,5-T

3. 2,4,5-TP (Silvex)
4. PCB's

Sample digestates (Metal Wastes)

All tissue and sediment digestates will be disposed of in bottles clearly marked as

HAZARDOUS WASTE
Contains Metal Waste
Mercury, Lead, or etc...
DATE: / /

Water digestates with high concentrations of metals (exceeding hazardous waste standard levels) will also be disposed of in "METAL WASTE' bottles.

Any TCLP Toxicity extract which fails the test shall be disposed of in bottles clearly marked as

HAZARDOUS WASTE
TCLP EXTRACT
Contains mercury, silver, lead or etc...
DATE: / /

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Documentation on the metals waste bottles.

1. Identify all acids in the container (nitric, hydrochloric, sulfuric, acetic, etc.)
2. Attach label which contains all metals which are currently being analyzed.
3. Identify all metals whose concentration in the bottle might exceed 1%.

Standards

Organic

1. All standards must go into flammable sample waste bottles.
2. The standard and solvent should be clearly identified on the label.
3. If the concentration of any one standard is estimated to exceed 0.1% when diluted to 4 liters, the approximate concentration must be noted on the label.
4. Standards for the following must be isolated and disposed of in appropriately marked containers.
   a. Potential Dioxin containing standards.
   b. PCB's

Inorganic

Metals- All standards with a concentration of > 10 ppm shall be disposed of in the metals waste bottles.

a. Exceptions
    1. All mercury standards must be retained for disposal
    2. All silver standards should be retained for disposal.
    3. Standard of Cd, Pb, Tl, Sn, Be, Cr, As, Se, in concentration of > 1ppm should be retained for disposal.

Cyanide- All standards shall be disposed of in the cyanide waste bottles.

STORAGE OF HAZARDOUS WASTE

Hazardous wastes may be temporarily stored in the laboratory in the appropriate cabinet (solvent, acid, etc.,) no longer than three days once dated.

All hazardous waste bottles should be clearly marked with the concentration of each waste and the date once the bottle is full.

When disposing of waste bottles to the waste drum, please follow these simple guidelines.

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* Always brings a co-worker with you.
* Bring appropriate safety equipment such as gloves, safety eyewear, and respirator.
* Contact the safety officer if there are any leaks or spillage.

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All waste bottles must be disposed of properly into the appropriately marked drum.

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Chlorinated Waste (90 % Methylene Chloride)
Non-Chlorinated Waste (Acetone, Xylene and ect.) Flammable Liquid
Metals with mercury (Corrosive)
TKN Waste Corrosive Liquid
TP Waste Corrosive Liquid
Phenol Liquid Waste (Poison)
Cyanide Liquid Waste (Corrosive pH >10. Poison)
Formaldehyde Liquid Waste (Flammable)
Chromerge Liquid Waste(Corrosive)

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All waste drums must have a 6" x 6" HAZARDOUS WASTE sticker as shown below.

HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

NOTE: *DO NOT FILL THE DRUM FULL. PLEASE LEAVE A 3" TOP SPACE IN THE DRUM. THIS IS A DEPT. OF TRANSPORTATION REGULATION.*

NOTICE: Do not leave empty glass bottles in the waste room.

All empty glass bottles must be triple rinsed before dispose in the solid waste container.

Chapter 4: Contingency Plans and Emergency Procedures

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In 1992, FDEP Central Chemistry laboratory generator category falls into Small Quantity Generator because it produces between 100 kg-1000 kg of hazardous waste per month. This chapter outlines the contingency plans and emergency procedures at the FDEP Central Chemistry Laboratory that meet Small Quantity Generator under RCRA's regulation.

Contingency Planning for SQGs

When hazardous wastes are involved, the danger of fires, spills, explosion and similar accidents is particularly serious. The Resource Conservation and Recovery Act (RCRA) regulations include detailed requirement for preventing and preparing for such accidents. Under Environmental Protection Agency's regulation, Small Quantity Generators are required to:

1. **Appoint An Emergency Coordinator**
   At all time, an "Emergency Coordinator" that is someone familiar with the various emergency procedures and requirement, must be onsite or on call. The Emergency Coordinator is responsible for responding to any emergencies involving hazardous waste at a given facility. The Emergency Coordinator needs to:

   - Know what hazardous wastes are generated and where they stored;
   - Understanding the requirements of the hazardous waste management regulations;
   - Be prepared to initiate and coordinate the proper handling procedures and an - emergency responses for each hazardous waste on the premises;
   - Be available on the premises or by telephone should an emergency arise.

2. **Post Information**
   EPA's SQG regulation require SQG to post information related to hazardous wastes. The required items are:

   - Name and Telephone number of Emergency Coordinator(s). EC must be on call 24 hours.
   - Location of fire extinguishers, spill control material and the fire alarm. Use floor diagram showing the location of these items.
   - Telephone number of the Fire Department. The Fire Department should have, or
   - know how to quickly reach, specially-trained emergency response personnel to
   - handle hazardous waste emergencies.

3. **Educate Employees**
   SQG must ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures. Things employee should know:

   - The kinds of hazardous wastes you generate, the nature of the hazard(s), and safe management procedures;
   - Any special instructions for employees about working around and handling hazardous materials and hazardous wastes in a safe manner;
   - Who the Emergency Coordinator is, where the emergency phone numbers and equipment are located and what procedures have been set up in case of a hazardous waste emergency;
   - Employee roles and responsibilities in implementing the emergency procedures.

4. **Respond to Emergencies**
   The Emergency Coordinator and other personnel as necessary, must respond to any emergencies that arises.

EMERGENCY COORDINATOR

In the event of accident, damage, spill or theft involving Hazardous Materials, please notify the following personnel listed below.

Nhon Vo (Emergency Coordinator)	850-510-6821	Home: 850-656-5535
Todd Risk (Back-Up Coordinator)	850-245-8195	Home: 850
Tim Fitzpatrick (Back-Up Coordinator)	850-245-8083	Home: 850-984-5795

FIRE IN THE LABORATORY

If a fire is discovered, yell "**FIRE**", survey the situation and follow these procedures:

If it is possible, try to put the fire out with a fire extinguisher. Pull the fire alarm immediately regardless of the size of the fire.

If the fire is out of control, pull a fire alarm, tell everyone to get out, and make sure no one is injured. Pulling the fire alarm automatically telephones the Fire Department. Locate the nearest room exit, as shown in the evacuation maps (See Appendix A). Close all hoods and doors if possible on the way out and get out. **DO NOT** lock doors behind you, as this may prevent escape for others and entry of firemen.

Do not try to use the fire hose in the hallway. Allow firemen to do that. Water plus electricity can electrocute you if you are not properly insulated. It should take you no more than two minutes to exit the building. Once outside, proceed immediately to the prearranged meeting place without delay so that a head count can be taken (see Appendix A). Your delay could cost the life of a fellow worker attempting to re-enter the building

to save you, when you are really outside the building. The meeting place for the Chemistry Section is shown on the evacuation map. Memorize it.

CLOTHING FIRE EMERGENCIES

Stop the person on fire from running! Do not allow anyone to run, not even to a fire blanket.

Drop the person to the floor or other horizontal surface. Standing will allow flames to spread upward. Standing in a fire blanket can funnel hot gases to the face.

Roll the person to snuff out the flames. Blankets can be useful if they are brought to the person on fire.

Cool the person. Remove smoldering clothing. Use water or ice packs to cool burns and minimize injury.

Summon medical assistance.

CHEMICAL SPILLS

Acid or Base Spill

If you or another individual are splashed with a chemical such as a strong acid or base, stand under the emergency shower and pull the handle. Call for help. Rinse well for at least 15 minutes.

Remove any clothing that is soaked with chemicals from the splash.

Notify your supervisor and safety officer.

Seek medical assistance if needed.

Flammable or Toxic Solvent Spill

If there is a flammable or toxic solvent spill, remove a solvent absorbent pillow from the box and place the absorbent pillow on the spill. While doing this, tell other employees to turn off all sources of ignition, such as ovens, flames, and furnaces from AA's, FID's and GC injection ports.

Place the absorbent pillow into a plastic bag. Label the bag as "**HAZARDOUS WASTE".**

HAZARDOUS WASTE
Toxic Solvent Spill
List the name of the chemical
Date: / /

Notify the Emergency Coordinator or the Safety Officer.

After all odors outside the hood have dissipated, ignition sources may be re-energized.

Mercury Metal Spill

Mercury is extremely toxic through skin contact. Because there is no odor or warning properties, mercury vapors cause the greatest concern on spillage. The traditional methods of cleaning mercury spills have been to sprinkle powered sulfur over the contaminated surface and precipitate mercury sulfide. All mercury spills will receive immediate and continued attention by the person responsible for the spill. Droplets of mercury in cracks and crevices should be vacuumed up using a "mercury vacuum cleaner," and deposited in a waste mercury storage container, covered with water.

SPILLS OF RADIOACTIVE MATERIALS

Call for help

Do not try to clean up the spills by yourself.

Close all doors on the way out and get out.

Notify safety officer and your supervisor.

Seek medical attention if needed.

VENTILATION SYSTEMS FAILURE

Ventilation is needed for dispensing operations that disperse vapors or aerosols which are corrosive, irritating, toxic, or flammable. If the ventilation system fails, please follow these procedures:

Alert personnel in the vicinity of the emergency.

Evacuate the area.

Summon assistance from a supervisor or the safety officer.

EMERGENCY CARE FOR EYE INJURIES

Call for help (9-911).

Immediately flush eye(s) with water for a minimum of 15 minutes. While the eye(s) is being washed, have another employee call the emergency eye doctor for instruction and an emergency appointment. The eye doctor on call will tell you to bring the injured person either to his office or to the hospital. Enroute, keep eye(s) closed. Be sure to have the nurse/doctor flush out your eye(s) again immediately upon arrival, no matter how much flushing you have already done.

Write down the name of the chemical that splashed in the eye(s) and how the accident occurred.

OTHER MEDICAL EMERGENCIES

Provide first-aid or CPR if appropriate and call for help.

If the injury is serious, phone for an ambulance and ask for instruction (call 9-911). Do not move the person if a back injury is suspected.

Report all injuries to the safety officer for further instructions.

BUILDING EVACUATION

This is basic to all emergencies that require that the building be cleared of occupants, in cases such as fire, leak of toxic gas, or threat of explosion. To comply with most legal requirements, evacuation routes are clearly posted within each building, and all laboratories have a tested plan of evacuation.

When the alarm sounds, the floor warden/manager authoritatively takes charge of the situation, telling the occupants how to leave the building and where to assemble outside. After the last person has left the laboratory, the floor warden quickly checks to make sure that no one remains inside the laboratory. Once outside at the assembly point, the supervisor accounts for everyone in the group. All personnel are to remain outside until a prearranged signal is given allowing return to the building. (See Evacuation Maps, Appendix A)

CHAPTER 5: WASTE MINIMIZATION AND PRACTICES

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Part 16, Generator's Certification of the Uniform Hazardous Waste Manifest stated that hazardous waste generator must have "*a program in place to reduce the volume and toxicity of waste generated...and selected the practicable method of treatment, storage, or disposal currently available to which minimizes the present and future threat to human health and the environment*". A number of laws and regulations now require waste minimization planning and reporting are likely to become law in the near future. The benefits of reducing waste generation are significant. The danger of accidents and personnel exposure are minimize, and the liability and negative publicity associated with such incidents are a clear incentive to waste minimization.

Commitment by Management and Workers

All laboratory workers should be made aware of the institutional and social costs, risks, and liabilities of hazardous waste. The laboratory manager and each worker must question whether the generation of each bit of laboratory waste is necessary and, if so, how it can be minimized. This attitude should apply to all types of waste, not just hazardous waste. Waste minimization must be a part of the training program.

Reducing Waste

The following represent a prioritization of that and other options:

1. **Reduce amounts generated**: this can be achieved by selection of chemicals prior to beginning the procedure. If possible, reduce the scale of a procedure so that less waste is generated.

2. **Reuse**: Redistribution of surplus or unwanted reagents within the same facility is the best example of reuse. This practice clearly eliminates disposal costs, saves additional purchasing costs, and eliminates a host of handling problems.

3. **Recycle**: Recycling is a term for the conversion of any discarded material into a new material. The potential for recycling of laboratory wastes is significant, particularly as part of an overall waste management program.

4. **Treat to reduce or eliminate hazard (whether chemical, biological, or thermal):** The treatment of hazardous waste without an EPA permit authorizing it is generally prohibited. Waste mineral acids or bases can be treated inexpensively by neutralization. Elementary neutralization is an exempt treatment activity according to EPA (see 40 CFR 264.1(g)(6) and 265.1(c)(10)).

5. **Dispose**: Have waste dispose by waste disposal firm such as Safety Kleen or Waste Management Inc.

FDEP Laboratories Waste Minimization Practices

To reduce the volume of hazardous waste, the laboratory has implemented a waste reduction techniques. The techniques include training, redistribution of chemicals, and substitution.

Lab glass cleaning**:** "No-Chromix," enzymatuc cleaners, detergents instead of chromerge (sulfuric acid-sodium dichromate).

Alcohol/glycol thermometers for mercury thermometers.

Formaldehyde Solution

Elementary Neutralization of Acids and Bases wastes to be dispose into public owned treatment works (POTW). See Appendix B on Sewer Use Policy

Redistributed of unused lab chemicals to Florida A.M. University and Florida State University.

Procedure for off-site transporting of lab chemicals

Once a chemical leaves the laboratory building, specific waste transportation rules must be followed. To transport hazardous chemicals along public road, an institution must follow EPA and DOT transportation requirements.

The DOT requires that any hazardous material be shipped with precautionary marking and labeling. Containers should show the proper DOT shipping name, the UN/NA identification number, the hazard class, and other marking requirements. These rules can be found in 49 CFR 172.101. A Bill of Lading must accompanied shipping and handling.

APPENDIX A

EVACUATION MAPS

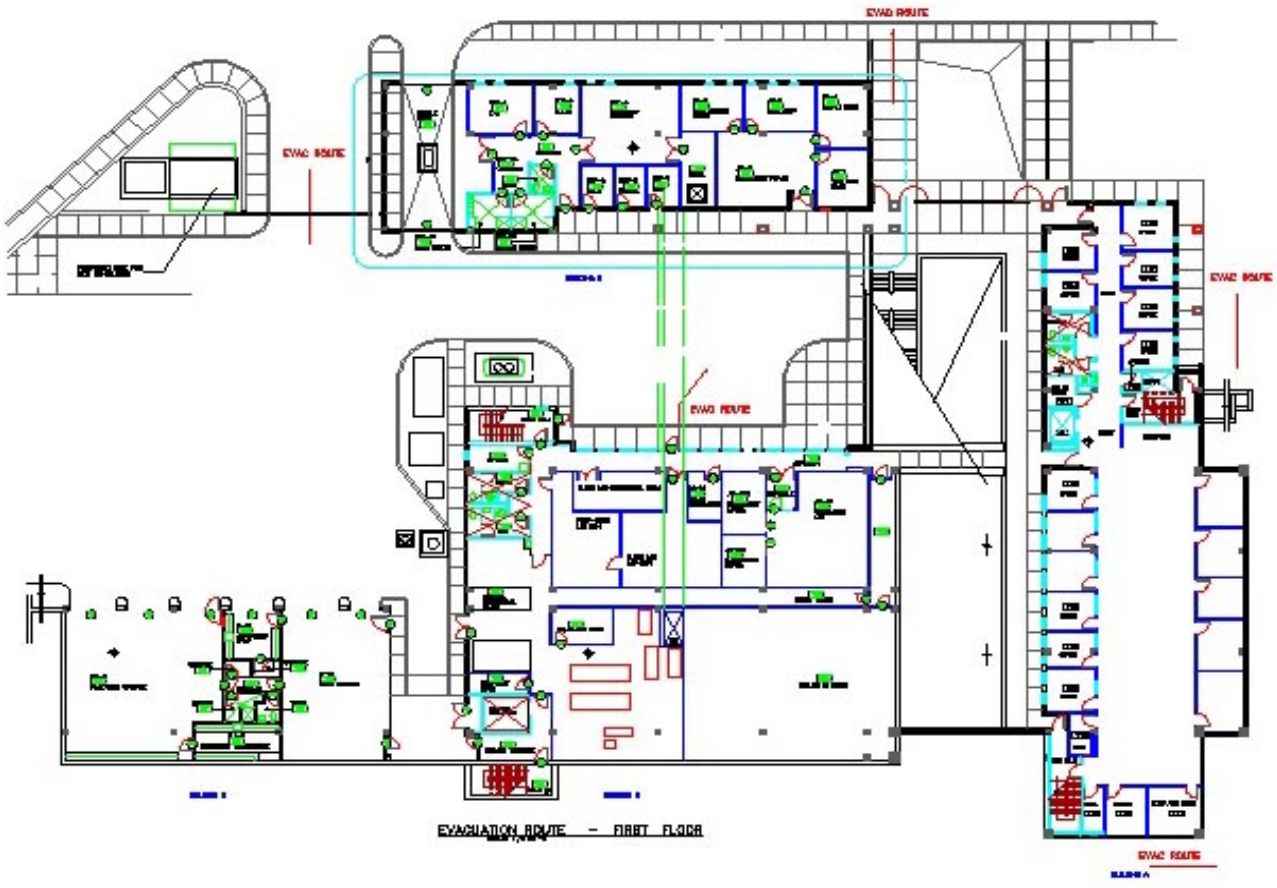

Figure 1. Evacuation Route – First Floor

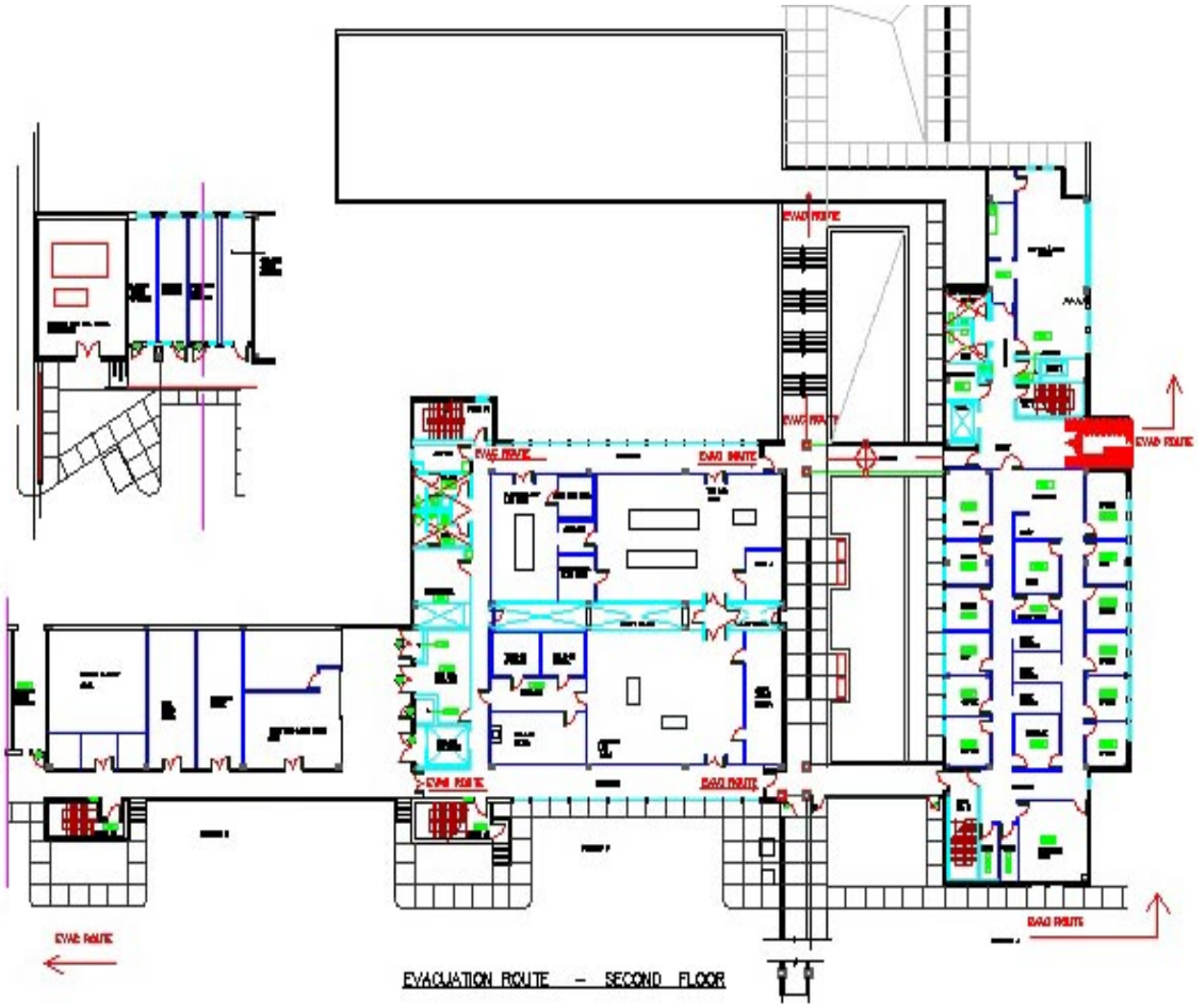

Figure 2. Evacuation Route – Second Floor

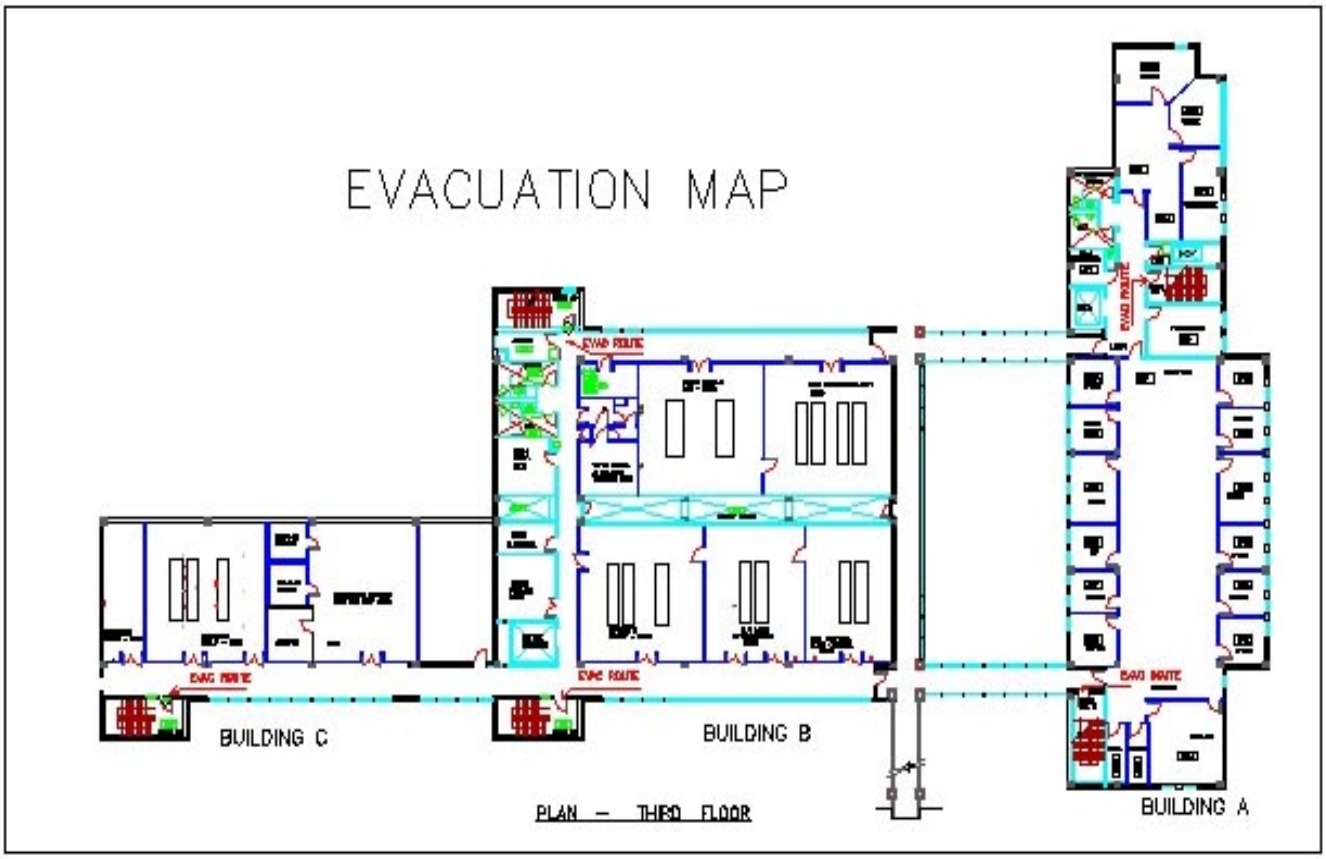

Figure 3. Evacuation Route – Third Floor

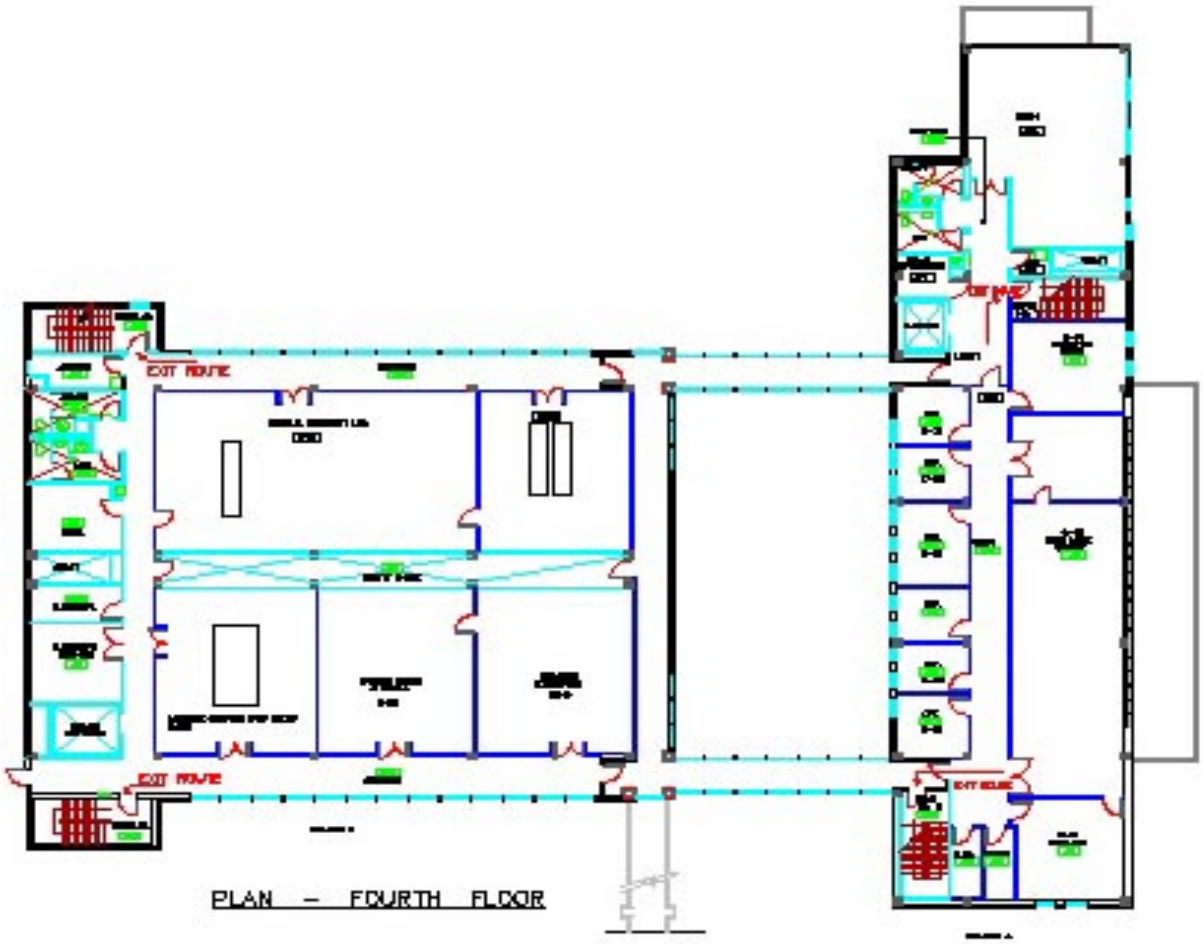

Figure 4. Evacuation Route – Fourth

Appendix B: Sewer Use Policy

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SEWER USE POLICY

The purpose of this policy is to provide for the maximum possible beneficial public use of the City of Tallahassee's wastewater facilities through regulation of sewer use and wastewater discharge.

GENERAL DISCHARGE REQUIREMENT

1. Any liquids, solids or gases which by reason of their nature or quantity are, or may be, sufficient, either alone or by interaction with other substances, to cause fire or explosion or to be injurious in any other way to the wastewater system. Included in this prohibition are wastestreams with a closed cup flashpoint of less than 140 F (60 C).

2. Any wastewater having a pH less than 5.0 or more than 10.0, or otherwise cause corrosive structural damage to the system, city personnel or equipment.

3. Any wastewater containing pollutants in sufficient quantity (flow or concentration), either singly or by interaction with other pollutants, to pass through or interfere with the City's wastewater system, any wastewater treatment or sludge process, or constitute a hazard to humans or animals. No user shall discharge at a rate greater than one hundred fifty six (156) pounds per day of BOD, or one hundred eighty eight (188) pounds per day of Suspended Solids, or three hundred (300) pounds per day COD, unless specifically authorized by the Director.

4. Any wastewater having a temperature greater than 150 F (55 C) at the point of discharge to the wastewater system, or which will inhibit biological activity in the treatment plant resulting in interference, but in no case wastewater which causes the temperature at the introduction into the treatment plant to exceed 104 F (40 C).

5. Any material containing ammonia, ammonia salts, or other chelating agents which will produce metallic complexes in sufficient quantities to cause interference with the wastewater system.

6. Any material identified as hazardous waste according to 40 CFR Part 261 except as may be specifically by the Director.

7. Any discharge of PCB's, Dioxin and pesticides listed in Appendix A. This list includes PCB's, DDT, DDE, DDD or other substances that are banned for sale or use in the United States, the State of Florida, Leon County or the City of Tallahassee.

FEDERAL CATEGORIAL PRETREATMENT STANDARDS

User subject to categorical pretreatment standards are required to comply with applicable standards as set out in 40CFR Chapter I, Subchapter N, Parts 405-471 and incorporated herein. They must also comply with every other limitation and requirement of this policy.

Specific Pollutant Limitations

The following pollutant limits are established to protect against pass through and interference. No existing source shall discharge wastewater containing in excess of the following maximum allowable discharge limits after January 1, 1993. No new source shall discharge wastewater containing in excess of the following allowable discharge after the adoption of the limit:

Arsenic	0.2 mg/L
Cadmium	0.04/mg/L
Chromium	1.5 mg/L
Cyanide	0.4 mg/L
Iron	26.0 mg/L
Lead	0.7 mg/L
Mercury	0.03 mg/L
Nickel	0.2 mg/L
Selenium	0.1 mg/L
Silver	2.0 mg/L
Zinc	1.0 mg/L

Appendix B
Regulated Pollutants

TOTAL TOXIC ORGANIC COMPOUNDS
(2 ppm Total)

VOLATILE COMPOUNDS

Acrolein
Benzene
Carbon Tetrachloride
Chlorodibromethane
2-Chloroethylvinyl Ether
Dichrolorobromorthane
1,2-Dichloroethane
1,2-Dichloropropane
Ethylbenzene
Methyl Chloride
1,1,2,2-Tetrachloroethane
Toluene
1,1,1-Trichloroethane
Trichloroethylene
Vinyl Chlorida
Acrylonile
Bromoform
Acrylontrile
Chloroform
1,1-Dichloroethane
1,1-Dichloroethylene
1,3-Dichloropropylene
Methyl Bromide
Methylene Chloride
Tetrachloroethylene
1,2-Trans-Dichloroethylene
1,2,2-Trichloroethane

ACID COMPOUNDS

Chlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
4-Nitriophenol
Pentachlorophenol
2,4,6-Trichlorophenol
2,4-Dichlorophenol
4,6-Dinitro-O-Cresol
2-Nitrophenol
P-Chloto-M-Cresol
Phenol

BASE/NEUTRAL COMPOUNDS

Acenaphthene
Anthracene
Benzo (a) Anthracene
Benzo (b) Fluoranthene
Benzo (k) Fluoranthene
Bis (Chloromethyl) Ether
Bis (2-Ethylhexyl) Phthale
Butyl Benzyl Phthalate
4-Chlorophenyl Phenyl Ether
Dibenzo (a,h) Anthracene
1,3-Dichlorobenzene
3,3 –Dichlorobenzidine
Dimethyl Phthalate
2,4-Dinithrotoluene
Di-N-Octyl Phthalate
Fluoranthene
Fluorene
Acenaphtylene
Benzidine
Benzo(a) Pyrene
Benzo (ghi) Perylene
Bis(2-Chloroethoxy) Methane
4-Bromophenyl Phenyl Ether
2-chloronaphthalene
Chrysene
1,2-dichlorobenzene
1,4-Dichlorobenzene
Diethyl Phthalate
Di-N-Butyl Phthalate
2,6-Dinitrololuene
1,2-Diphenylhydrazine
Hexachlorobenzene
Hexachlorocyclopentadien
Indeno (1,2,3-cd) Pyrene

Hexachlorobutadiene
Hexachloroethane
Isophorone
Nitrobenzene
N-Nitrosodi-N-Propylamine
Phenanthrene
Naphthalene
N-Nitrosodimethyylamine
N-Nitrosodiphenylamine
Pyrene
1,2,4-Trichlorobenzene

PESTICIDE, DIOXIN AND PCBS

(PROHIBITED)
DO NOT DISCARD DOWN THE SEWER

Aldrin
Alpha-BHC
4,4'DDT
4, 4' –DDD
Alpha-endosulfan
Endosulfan Sulfate
Endrin Aldehyde
Heptachlor
PCB-1254
PCB-1232
PCB-1260
Toxaphene
Gamma-BHC
Delta-BHC
Chlordane
4, 4' DDE
Beta-Endosulfan
Endrin
Heptachlor
PCB-1242
PCB-1221
PCB-1248
PCB-1016
TCDD

METALS AND CYANIDE

Arsenic
Chromium
Lead
Nickel
Silver
Cyanide
Cadmium
Copper
Mercury
Selenium
Zinc

Appendix C

MAXIMUM CONCENTRATION OF CONTAMINANTS FOR THE TOXICITY CHARACTERISTICS (TCLP)

EPA HW Number	CONTAMINANT	CHARACTERISTIC LEVEL (mg/l)
D004	Arsenic	5.0
D005	Barium	100.0
D018	Benzene	0.5
D006	Cadmium	1.0
D019	Carbon Tetrachloride	0.5
D020	Chloradane	0.03
D021	Chlorobenzene	100.0
D022	Chloroform	6.0
D007	Chromium	5.0
D023	o-cresol	200.0
D024	m-cresol	200.0
D025	p-cresol	200.0
D026	Cresol	200.0
D016	2,4-D	10.0
D027	1,4-Dichlorobenzene	7.5
D028	1,2-Dichloroethane	0.5
D029	1,1-Dichloroethylene	0.7
D030	2,4-Dinitrololuene	0.13
D012	Endrin	0.02
D031	Heptachlor (and its hydroxide)	0.008
D032	Hexachlorobenzene	0.13
D033	Hexachlorobutadiene	0.5
D034	Hexachloroethane	3.0
D008	Lead	5.0
D013	Lindane	0.4
D009	Mercury	0.2
D014	Methoxychlor	10.0
D035	Methyl ethyl ketone	200.0
D036	Nitrobenzene	2.0
D037	Pentachlorophenol	100.0
D038	Pyridine	5.0
D010	Selenium	1.0
D011	Silver	5.0
D039	Tetrachloethylene	0.7
D015	Toxaphene	0.5
D040	Trichloroethylene	0.5
D041	2,4,5-Trichlorophenol	400.0
D042	2,4,6-Trichlorophenol	2.0
D017	2,4,5-TP (silvex)	1.0
D043	Vinyl Chloride	0.2

TYPICAL WASTE STREAMS AND EPA HAZARDOUS WASTE NUMBERS

ACID/BASES

Acids, bases or mixture having pH less than or equal to 2 or greater than or equal to 12.5 are considered to be corrosive. All corrosive materials and solutions have the EPA Hazardous ***Waste Number of D002***. The following are some examples of the more commonly used corrosives:

Examples of Corrosive Waste Streams

Acetic Acid	Oleum
Ammonium Hydroxide	Perchloric Acid
Chromic Acid	Phosphoric Acid
Hydrobromic Acid	Potassium Hydroxide
Hydrochloric Acid	Sodium Hydroxide
Hydrofluoric Acid	Sulfuric Acid
Nitric Acid	

HEAVY METALS/INORGANICS:

Heavy Metals and other inorganic waste materials exhibit the characteristic of TCLP Toxicity and are considered hazardous if the extract from a representative sample of the waste has any of the specific constituent concentrations as shown in 40 CFR 261.24, Table 1. This may be include dusts, solutions, wastewater treatment sludges, paint wastes, waste inks and other such materials which contain heavy metals/inorganics. The following are TCLP Toxic:

Waste Stream	**Waste Number**
Arsenic	D004
Barium	D005
Cadmium	D006
Chromium	D007
Lead	D008
Mercury	D009
Selenium	D010
Silver	D011

IGNITABLE WASTES:

Ignitable wastes include any flammable liquids, nonliquids, and contained gases that have flashpoint less than 140F. Examples are spent solvents, solvent still bottoms, ignitable paint wastes, epoxy resins and adhesives, and waste ink containing flammable solvents. Unless otherwise specified, all ignitable wastes have an EPA Hazardous ***Waste Number of D001***.

Some commonly used ignitable compounds are:

Waste Stream	EPA Hazardous Waste Number
Acetone	F003
Benzene	D001
n-Butyl Alcohol	F003
Chlorobenzene	F002
Cychlohexane	F003
Ethyl Acetate	F003
Ethylbenzene	F003
Ethyl Ether	F003
Ethylene Dichloride	D001
Methanol	F003
Methyl Isobutyl Ketone	F003
Petroleum Distillates	D001
Xylene	F003

LEAD ACID BATTERIES:

Waste Stream	EPA Hazardous Waste Number
Lead Dross	D008
Spent Acids	D002
Lead Acid Batteries	D008, D002

PESTICIDES:

Pesticides, pesticide residues, washing and rinsing solutions and dips which contain constituent concentrations at or above Toxicity Characteristic regulatory levels are hazardous waste.

Waste Stream	EPA Hazardous Waste Number
Aldicarb	P070
Aldrin	P004
Amitrode	U011
Arsenic Pentoxide	P011
Arsenic Trioxide	P012
Cacodylic Acid	U136
Ethy Ester	U178
Chlordane	U036
Copper Cyanides	P029
1,2-Dibromo-3-Chloropropane	U066
1,2-Dichloropropane	U083
1,3-Dichloropropene	U084
2,4-Dichlorophenoxy Acetic Acid	U240
DDT	U061
Dieldrin	P037
Dimethoate	P044
Dimethylcarbamoyl	U097

Dinitrocresol	P047
Dinoseb	P020
Disodium Monmomethane arsonate	D004
Disulfoton	P039
Endosulfan	P050
Endrin	P051
Ethylmercuric Chloride	D009
Famphur	P097
Nepthachlor	P059

SOLVENTS:

Waste Stream	**EPA Hazardous Waste Number**
Benzene	D001
Carbon Disulfide	F005
Carbon Tetrachloride	F001
Chlorobenzene	F002
Cresols	F004
Cresylic Acid	F004
O-Dichlorobenzene	F002
Ethanol	D001
Ethylene Dichloride	D001
Isobutanol	F005
Isopropanol	D001
Kerosene	D001
Methyl Ethyl Ketone	F005
Methylene Chloride	F001 (Sludges) F002 (Still Bottoms)
Naphtha	D001
Nitrobenzene	F004
Petroleum Solvents	D001
Pyridine	F005
1,1,1-Trichloroethane	F001 (sludges) F002 (Still bottoms)
Tetrachloroethylene	F001 (sludges) F002 (Still bottoms)
Toluene	F005
Trichloroethylene	F001 (Sludges) F002 (Still bottoms)
Trichlorofluoromethane	F002
White Spirit	D001

REACTIVES:

Reactive wastes include reactive materials or mixtures which are unstable, react violently with mixture with water, generate toxic gases or vapors when mixed with water, or are capable of detonation or explosive reaction when irritated or heated. The following materials are commonly considered to be reactive:

Waste Stream	**EPA Hazardous Waste Number**

Acetyl Chloride	D003
Chromic Acid	D003
Cyanides	D003
Organic Peroxides	D003
Perchlorates	D003
Permanganates	D003
Hypochlorites	D003
Sulfides	D003

BROKEN THERMOMETERS

Waste Stream	**EPA Hazardous Waste Number**
Spent Mercury	D009

CYANIDE WASTE

Waste Stream	**EPA Hazardous Waste Number**
pH > 10 Cyanide Solution	D003, D002

METHYLENE CHLORIDE WASTE

Waste Stream	**EPA Hazardous Waste Number**
Filters w/ methylene choloride	F001