UNIVERSITY OF SOUTH FLORIDA

Chemical Hygiene Plan

Environmental Health & Safety
A Department of Facilities Management
4202 Fowler Avenue, OPM 100
Tampa, FL 33620-6980
Phone: (813) 974-4036
Fax: (813) 974-9346

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1 Introduction

As a research and educational institution, the University of South Florida (USF) is morally and legally obligated to provide a safe working environment for all its employees and students. Since USF employs workers engaged in the laboratory use of hazardous chemicals, the University will comply with the provisions of the Occupational Safety and Health Administration (OSHA) standard: "29 CFR§1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories." This standard is commonly referred to as "**The OSHA Lab Standard**." It was developed to provide increased protection to laboratory employees beyond that provided in the General Industry Standards. The OSHA Lab Standard is also a "performance- oriented standard." This means OSHA establishes the minimum requirements, but the methods for achieving these requirements are left up to the employer. The backbone of the Lab Standard is its requirement for employers to develop and carry out the provisions of a written **Chemical Hygiene Plan (CHP)**, which requires development of **standard operating procedures (SOPs)** for work with hazardous chemicals in laboratories.

With the great diversity of lab activities on campus, it is impossible for any one person to develop SOPs for every activity in every laboratory. However, the performance-oriented nature of this standard makes it possible to construct a general framework that can be used by individual laboratories to meet the requirements of the OSHA Lab Standard.

This document constitutes the USF CHP. It details laboratory safety policies, procedures, and standards at USF. Implementation of the guidelines in this document depends on the cooperation of department chairpersons, faculty, laboratory staff, students, Environmental Health and Safety (EH&S) staff and members of safety committees. Although Principal Investigators bear the ultimate responsibility for safe conditions and procedures in their laboratories, each member of a laboratory group is responsible for complying with standards put forth in this document with the common goal of promoting a healthy and safe working environment for employees and students. The CHP applies to all areas engaged in the laboratory use of hazardous chemicals.

In addition to complying with the CHP, laboratories using radioactive materials, X-rays, certain lasers, biological agents, and recombinant DNA must comply with the requirements of USF Research Integrity and Compliance.

There may be some situations where proper facilities and equipment are not available for conducting project requirements. When this is the case, faculty members should consult EH&S for assistance in evaluating hazards and finding ways to conduct activities safely. This document should not be considered a comprehensive review of all potential hazards. Individuals with more specific questions should contact EH&S directly.

2 Implementation and Responsibilities

The Chemical Hygiene Plan will be implemented and administered by the Chemical Hygiene Officer who is a member of EH&S. The Chemical Hygiene Officer, in coordination with the University Field and Laboratory Safety Committee, is responsible for developing, implementing, and reviewing the written Chemical Hygiene Plan, which will be reviewed annually and updated as needed. The CHP is readily accessible to laboratory personnel on the EH&S web site (www.usf.edu/ehs).

Although the Chemical Hygiene Officer is responsible for the development and implementation of the Chemical Hygiene Plan, it is important to realize that the responsibility for chemical hygiene rests at all levels of the University. Responsibilities under the CHP are outlined as follows:

1. **The President of the University**, as the chief executive, has ultimate responsibility within the institution, and along with other administrators, provides continuing support for the CHP.
2. **Vice-Presidents**, **Deans**, **Department Heads**, and **Principal Investigators** are responsible for compliance with the CHP within their areas. This includes ensuring that all employees, guests, and visiting scientists working within their areas are informed of, and adhere to, chemical hygiene practices as outlined in the USF CHP. Vice-Presidents, Deans, Department Heads, and Principal Investigators must also provide appropriate personal protective equipment to those under their direct supervision.
3. **The University Chemical Hygiene Officer** is responsible for developing, implementing, and updating the CHP on behalf of the University President, or designated representative. The Chemical Hygiene Officer will assist departments and individual laboratories in implementing and complying with the CHP. The Chemical Hygiene Officer must also institute appropriate audit methods to ensure compliance.
4. **Department Safety Representatives** (as applicable) are responsible for ensuring Principal Investigators and Laboratory Managers develop and implement SOPs and training programs specific to their laboratories. Department Safety Representatives will maintain an up- to-date copy of the CHP, and act as a liaison to the University Chemical Hygiene Officer.
5. **Principal Investigators** and **Laboratory Managers** have overall responsibility for chemical hygiene in their laboratories. Each will develop and implement SOPs (see Appendix A: Standard Operating Procedures) and training programs specific to the work being carried out in their laboratories. They must also maintain current inventories for all chemicals stored in their laboratories and/or in other storage areas and have Safety Data Sheets (SDSs) readily accessible for all hazardous chemicals stored in their laboratories. Principal Investigators and Laboratory Managers must ensure that lab personnel understand and follow the CHP and attend required training.
6. **Laboratory Employees** are ultimately responsible for developing and applying good chemical hygiene practices as outlined in the CHP. They must always use the appropriate personal protective equipment provided. Laboratory Employees are required to report all accidents, injuries, and illnesses to their supervisors (see Appendix D).

3 Definitions

The definitions listed below are taken directly from the OSHA Lab Standard (29 CFR§1910.1450(b))>

Chemical Hygiene Plan: A written program developed and implemented by an employer which sets forth procedures, materials, personal protective equipment and work practices that (i) are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace and (ii) meet the requirements of paragraph (e) of the Lab Standard.

Emergency: Any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment that results in an uncontrolled release of hazardous chemicals in the workplace.

Employee: An individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

Hazardous chemical: A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees.

Health hazard: A term that includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes.

High degree of acute toxicity: The phrase "high degree of acute toxicity" is undefined in the standard and is subject to wide variation in interpretation. For the purposes of the USF CHP, the phrase means that substances with high acute toxicity may be fatal or cause damage to target organs as a result of a single exposure or exposure of short duration. Examples include substances such as hydrogen cyanide, hydrogen sulfide, and nitrogen dioxide.

Laboratory: A facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory scale: Work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

Laboratory-type hood: A device located in a laboratory that is enclosed on five sides with a movable sash or fixed partial enclosure on the remaining side. It is designed to prevent or minimize the escape of air contaminants into the laboratory and to keep the breathing zone of the operator uncontaminated. Walk-in hoods with adjustable sashes meet this definition provided, the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazardous chemicals.

Laboratory use of hazardous chemicals: The handling or use of such chemicals in which all of the following conditions are met:

- Chemical manipulations are carried out on a "laboratory scale;"
- Multiple chemical procedures or chemicals are used;
- The procedures involved are not part of a production process, nor in any way simulate a production process; and
- "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Physical hazard: A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water reactive.

Protective laboratory practices and equipment: Those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Reproductive toxins: chemicals that affect the reproductive capabilities including adverse effects on sexual function and fertility in adult males and females, as well as adverse effects on the development of the offspring. Chemicals classified as reproductive toxins in accordance with the Hazard Communication Standard (§1910.1200) shall be considered reproductive toxins.

Select carcinogen: any substance which meets one of the following criteria:

i. It is regulated by OSHA as a carcinogen; or

ii. It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or

iii. It is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs (IARC) (latest editions); or

iv. It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:

   A. After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m3;

   B. After repeated skin application of less than 300 (mg/kg of body weight) per week; or

   C. After oral dosages of less than 50 mg/kg of body weight per day.

4 Administrative Matters

4.1 Laboratory Registration and Closeout

All facilities designated for use in teaching, research or service activity where chemical agents are used or stored must be registered with EH&S. The registration information includes the names and contact information of the Principal Investigator (PI) and alternate contacts, laboratory location(s), and the laboratory hazard information. New PIs must register their laboratories with EH&S through the Laboratory Registration Form prior to beginning their laboratory operations. The laboratory registration form should be filled out by all new PIs, PIs moving into a new lab, when new contacts come into a lab, and before vacating/closing a laboratory.

4.2 Laboratory Safety Inspection Program

In order to protect the health and safety of laboratory personnel as well as the environment, EH&S conducts laboratory safety inspections to find and correct unsafe conditions and/or instances of non-compliance with applicable rules and regulations.

4.2.1 Inspection Program Responsibilities

4.2.1.1 Environmental Health & Safety

- Conduct laboratory safety inspections of USF facilities, and accompany inspectors from external regulatory agencies during inspections of University facilities.
- Document results on an inspection report and forward a copy to the responsible department or individual along with a definite, yet reasonable, deadline for correction of any discrepancies noted.
- Monitor status of corrections. If the responsible department or individual has not corrected discrepancies, submitted a plan of corrective action, or requested an extension by the original deadline, issue a second notice to the responsible department or individual with a shorter deadline for correction.
- If, after the second notice, a responsible department or individual has not corrected discrepancies, submitted a plan of corrective action, or requested an extension, send a memorandum to the next level of responsibility in the organizational structure, (i.e. Supervisor, Department head, Dean, Director, etc.) requesting action be taken to correct the outstanding discrepancies.
- If notification of the next level of responsibility does not result in the discrepancies being corrected, continue sending memorandums to increasingly higher levels of responsibility until reaching the Provost. Memorandums to the Provost will be sent by the Director, EH&S through the Associate Vice President of Facilities, and the Vice President of Administrative Services.

- Send a copy of the memorandum to all previously notified levels of responsibility each time a higher level is notified.
- Conduct follow up inspections or spot checks to ensure that corrections have been made.
- Maintain department files of all inspection documents, including a file of outstanding corrections that are difficult, expensive, or require major repair or modification that delays correction.

4.2.1.2 Responsible Individual or Department

- Cooperate with EH&S and external regulatory agency inspectors. If possible, have a representative participate in the inspection.
- Notify EH&S of all environmental, health, and safety inspections conducted by external regulatory agencies without EH&S participation, and forward a copy of any inspection reports received to EH&S.
- Within the established deadline, return a copy of the inspection report to EH&S indicating the date each discrepancy was corrected, and/or submit a plan of action with a timetable for correction of outstanding discrepancies. Submit a request for extension anytime a deadline cannot be met which explains why the deadline cannot be met.
- Submit service requests to correct deficiencies that require building repair or maintenance. Indicate the repair or maintenance needed is a safety discrepancy. Send a copy of the work order confirmation to EH&S.

4.2.1.3 Dangers to Life, Health, or Safety

In accordance with USF Policy, #6-016, if a situation is identified that is determined to pose a danger to life, health or safety, Environmental Health and Safety has the authority to restrict or suspend any activity, equipment or area that has been deemed to be unsafe. The situation must be immediately rectified and the resolution reported to and inspected by Environmental Health and Safety in order to resume normal operations. The equipment, activity or area found to be dangerous to life, health or safety may not be reinstated until Environmental Health and Safety has conducted a follow up inspection and has determined that the equipment and/or area is in compliance.

4.3 Visitors, Volunteers, and Minors

It is the responsibility of the Department's Chairperson, PIs, and Safety Supervisors to restrict access of visitors, minors, and volunteers to areas under their supervision when potential health and physical hazards exists. If authorization is granted, the organizer of the activity shall ensure proper PPE is used and consult with EH&S regarding any training requirements.

Minor children (under 18 years of age) are not allowed into any chemical, biological or radioactive materials laboratory at USF unless the minor child is participating in a program of study at USF and working in the laboratory is required as part of the course, or the minor child is participating in a supervised program officially sponsored by USF, such as a building tour, a field trip, or research activities in compliance with USF's policy on Minors in Hazardous Areas. Under no circumstances shall infants, toddlers, or children too young to understand safety training be permitted in University of South Florida System laboratories. Permission slips/waivers of liability may be required.

See the following for additional requirements relating to visitors, volunteers and/or minors:

- USF Human Resources Volunteer Guidelines.
- A parental release of liability form must be completed for minors under 18 and kept on file
- Review Child Labor Law information for minors under 18, and USF's Child Abuse Reporting Policy.
- View the USF Child Abuse Policy Training.
- Human Resources or the General Counsel's Office should be consulted for any liability waivers concerning minors. All minors, visitors, and volunteers shall comply with the University of South Florida's policies to minimize the risk of theft, injury, and/or property damage associated with allowing access to laboratories.

4.4 Disability and Accommodations

It is the policy of USF to comply fully with the requirements of the Americans with Disabilities Act of 1990 as amended by the Americans with Disabilities Act Amendments Act of 2008 and all other federal and state laws and regulations prohibiting discrimination and assuring accessibility on the basis of disability. USF Policy 0-108, Disability and Accommodations addresses disability and accommodation procedures for members of the public, USF employees, and USF students. Service animals in USF laboratories are governed by USF Policy 6-033, Animals on Campus.

5 Chemical Hygiene Plan Components

The OSHA Lab Standard specifies that eight elements be addressed in order to ensure the protection of laboratory employees. These eight elements, summarized below, are fully detailed in 29 CFR§1910.1450(e)(3) of the regulation.

1. Standard Operating Procedures for handling hazardous chemicals.
2. Control measures to reduce worker exposures.
3. Fume hood performance.
4. Employee information and training (including emergency procedures).
5. Requirements for prior approval of laboratory activities.
6. Medical consultation and medical examinations.
7. Chemical hygiene responsibilities.
8. Special precautions for work with particularly hazardoussubstances.

Responsibilities under the Chemical Hygiene Plan (element #7 above) have already been discussed. The remaining elements will be addressed in the pages that follow. This portion of the CHP is generalized and individual lab managers and PIs are responsible for tailoring this CHP to the specific needs of their areas. Contact EH&S with questions about adapting this CHP to a laboratory area. See also Appendix A: Standard Operating Procedures for more information.

6 Generalized Standard Operating Procedures

There are many excellent publications containing guidelines for the safe conduct of laboratory work; such as Safety in Academic Chemistry Laboratories, published by the American Chemical Society, and Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, published by National Research Council. These publications are oriented toward academic laboratories. They are recommended reading for all laboratory personnel. Consulting other safety information resources such as provided in Section 7.4.10 is highly encouraged. Contact EH&S for additional information.

The following basic safety practices apply to all laboratories[1]. Each laboratory must include any specific practices pertaining to SOPs used in that particular lab (Appendix A: Standard Operating Procedures).

[1] Adapted from the National Research Council's, "Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards," National Academy Press, Washington, DC, 2011.

6.1 Accidents and Spills

Eye Contact: Immediately flush eyes with water for a minimum of 15 minutes while holding eyelids open. In the event that only one eye has been affected, keep the other eye closed while flushing to minimize the probability of contamination spreading to the unaffected eye during flushing. As soon as flushing begins, contact emergency medical personnel who can provide further evaluation, assistance and treatment to avoid lasting eye injury and/or blindness.

Ingestion: Consult Safety Data Sheet (SDS) and call the Poison Control Information Center at 1-800-222-1222 for emergency response information for the specific compound ingested. Seek medical attention immediately. The SDS should accompany the patient to the medical treatment facility.

Skin Contact: Promptly flush the affected area with water, using safety shower if necessary, (minimum of 15 minutes). Remove any contaminated clothing while flushing with water, using care not to spread chemical contamination to other parts of the body. If clothing is usually removed by pulling overhead, cut the clothing off instead, using the safety scissors provided in first aid kits. If symptoms persist after washing, seek medical attention.

NOTE: In case of skin contact involving hydrofluoric acid (HF), thoroughly flush the affected area of the body and then curtain flushing. Immediately apply calcium gluconate gel or a 10% $^{w}/_{v}$ calcium gluconate solution to the affected area and seek medical attention. Application of the calcium gluconate antidote is imperative to minimize the risk of serious, lasting injury or fatality. On arrival, inform emergency medical personnel that a hydrofluoric acid exposure has occurred.

Inhalation: Immediately move the patient to fresh air and seek medical attention. In the event the patient is overcome, evaluate the area for your own personal safety prior to attempting to retrieve the victim. Do NOT attempt a rescue in an unsafe atmosphere without proper PPE and emergency response training. Well-intentioned rescuers have often become a victim as well in these situations.

Reporting: Should an accident occur, follow procedures outlined in Appendix D: Hazardous Materials Emergencies and Spills as well as the USF Reporting Procedures. Report all accidents to your supervisor.

Clean up: Promptly clean up all small spills using appropriate personal protective equipment and properly containerize and label the resulting waste. Contact EH&S for pick up and disposal. Consult SDSs and other safety information sources for specific clean-up recommendations. Contact EH&S to clean up large chemical spills or spills of highly toxic chemicals. For detailed information on procedures for accidents, spills and emergencies see Appendix D.

6.2 Avoidance of "Routine" Exposure

Develop and encourage safe work practices. Avoid unnecessary exposure to chemicals by any route and encourage proper personal hygiene (i.e. remove gloves and wash hands prior to leaving laboratory area). Do not smell or taste chemicals. Vent any apparatus that may discharge toxic chemicals (vacuum pumps, distillation columns, ovens, etc.) into local exhaust devices. Inspect gloves and test glove boxes before use. Do not allow release of toxic substances in cold rooms or warm rooms, since these contain recirculated atmospheres.

6.3 Choice of Chemicals & Waste Minimization

Strive to substitute less hazardous chemicals in place of more hazardous chemicals whenever practical. Use micro-scale lab techniques as often as possible. Share surplus chemicals with colleagues or allow EH&S to remove surplus chemicals for later redistribution (see the USF Waste Minimization Guide). Limit inventory on hand to chemicals and quantities necessary for laboratory activities. Inspect chemical inventories periodically and dispose of outdated chemicals in accordance with the USF Hazardous Waste Management Procedures (See Appendix B).

6.4 Shipping and Receiving Hazardous Materials

Shipping and receiving hazardous materials shall be done in accordance with Appendix C: Hazardous Materials Shipping/Receiving Guide. Hazardous materials packages must be inspected at the time of their arrival to ensure that they are not damaged or leaking. Do not accept damaged or leaking packages from delivery companies, and notify EH&S at (813) 974-4036 if damaged or leaking packages are discovered.

Do not accept hazardous materials packages that are not properly labeled in accordance with Department of Transportation (DOT) regulations. PIs/Lab Managers must ensure chemical containers are dated and entered into CHEMATIX upon receipt, and dated again when first opened. Gifts or donations of chemicals from off-campus sources should be approved by EH&S before acceptance.

6.5 Compressed Gas Cylinders

Compressed gas cylinders may present both physical and health hazards. Gases may be oxidizers, flammable, reactive, corrosive, or toxic and these properties must be considered when developing experimental procedures and designing apparatus. Compressed gases, when handled incorrectly, can be very dangerous with a high potential for explosion. Only cylinders designed, constructed, tested, and maintained in accordance with US Department of Transpiration (DOT) specifications and regulations shall be permitted. The use of non-DOT conforming cylinders must be evaluated and approved by EH&S on a case-by-case basis.

OSHA's general requirements for compressed gas cylinders can be found in 29 CFR 1910.101, which incorporates by reference the Compressed Gas Association's Pamphlets C-6-1968, C-8-1962, and P-1- 1965. These pamphlets describe the procedures for inspecting, handling, storing, and using compressed gas cylinders. The National Fire Protection Association also provides guidance on the management of cylinders in NFPA 55: Compressed Gases and Cryogenic Fluids Code, which is incorporated by reference into the Uniform Fire Code. Safety procedures that must be followed when handling, storing, and transporting compressed gas cylinders are summarized below:

- Cylinders must be clearly labeled with their contents.
- Regulators must be compatible with the cylinder contents and valve.
- Cylinders must be secured in an upright position by corralling them and securing them to a cart, framework, or other *fixed object* by use of a restraint.
- Cylinders must be stored in a cool, well-ventilated area away from ignition and/or heat sources.
- When not in use, cylinders must always be capped.
- Cylinder carts must be used to transport cylinders, and cylinders must be capped and properly secured during transport.
- Cylinders containing flammable gases must not be stored near oxidizers (minimum 20 ft. separation).
- Cylinders must not be stored near corrosives.
- Cylinders must be stored away from doors and exits.

Always secure all cylinders (new, used, or empty) to wall or bench/table/floor mounted cylinder brackets, cylinder carts, cylinder stands, or in cylinder cages. Restraints must be positioned above the center of gravity, usually at two-thirds the height of standard-sized cylinders.

The use of disposable or lecture size cylinders is strongly discouraged. If special circumstances warrant the use of these types of cylinders, the PI/Lab Manager is responsible for contacting EH&S for disposal of these types of cylinders.

Although cryogenic liquefied gases (e.g. liquid nitrogen) are generally not stored under pressure, laboratory personnel must become familiar with the special hazards associated with the use of these gases. Contact EH&S for additional information.

6.6 General Laboratory Safety Guidelines

Observe the following basic safety guidelines when working in a laboratory.

6.6.1 Eating, Smoking, etc.

Do not eat, drink, use tobacco products (smoke, chew, dip), chew gum, use cell phones or apply cosmetics in areas where laboratory chemicals are present. Remove gloves, wash hands and leave the area before conducting these activities. Do not store food or beverages in refrigerators or glassware that have been used for laboratory operations.

6.6.2 General Housekeeping and Apparel

Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored. Clean up the work area upon completion of an experiment or procedure and at the end of each day. When working with chemicals in a laboratory, proper attire and personal protective equipment are required.

- Wear long pants or a skirt that completely cover the legs.
- Wear appropriate closed toed shoes at all times in the laboratory. Shoes must cover the entire foot. Sandals, flip-flops, and other open-toed shoes are not allowed.
- Confine long hair and loose clothing and remove jewelry.
- Wear appropriate eye/face protection for the hazard(s) present.
- Wear a lab coat appropriate to the hazards encountered in the lab (i.e. chemical and/or fire resistant). It is recommended that lab coats have cuffs to reduce the likelihood of open cuffs catching on chemical containers or equipment.
- Note: Departments with teaching laboratories are responsible for determining the requirements for appropriate levels of PPE to be worn by their students in the laboratory as well as enforcing compliance with PPE use in their teaching laboratories.

6.6.3 Handling Equipment and Glassware

Handle and store laboratory glassware with care to avoid damage, and never use damaged glassware. Use extra care with Dewar flasks and other evacuated glass apparatus. Shield or wrap them to contain chemicals and fragments should an implosion occur. Use equipment only for its designed purpose. Decontaminate and properly dispose of damaged/unwanted glassware according to any chemical, biological or radiological hazards that may be present.

6.6.4 Unattended Operations

Leave lights on, place an appropriate sign on the door; include your name and telephone number as well as that of PI. Provide for containment of toxic substances in the event of failure of a utility service to an unattended operation. All unattended operations must be provided with automatic shutoffs to prevent accidents, fires, or explosions.

6.6.5 Working Alone

Avoid working alone in a building or laboratory. Prior written approval from the PI or lab manager is required before working alone in a laboratory as well as utilizing the University's Public Safety application (e.g. Guardian) while working alone. Working alone in a laboratory is prohibited when working with a compound of high or unknown toxicity.

6.7 Chemical Inventories - CHEMATIX

CHEMATIX is designed to provide real-time chemical inventory information to users and emergency responders, allow the USF community to access important chemical safety information, and facilitate efficient, compliant disposal of chemical waste. Laboratories must update their chemical inventories at least annually within CHEMATIX. Ideally, laboratories will update their chemical inventories more frequently.

6.8 Planning Operations

Observe the following best practices during the planning stage for all laboratory operations:

- Develop Standard Operating Procedures (see Appendix A).
- Seek information and advice about hazards.
- Review applicable Safety Data Sheets (SDSs) before handling chemicals.
- Plan appropriate safety procedures.
- Plan positioning of equipment before beginning any new operation.
- Locate emergency supplies and exits.
- Ensure that aisles are clear and kept clear during laboratory operations.

PIs or Lab Managers must approve all new experimental protocols or any significant changes to existing protocols.

6.9 Emergency Laboratory Shutdowns

Laboratory operations may need to be shut down quickly due to a variety of events including, but not limited to, severe weather, power outages, building evacuations, shelter-in-place orders, etc. Laboratory personnel must be able to quickly and safely suspend operations when necessary and comply with emergency directives issued by the University and/or local authorities. Laboratory personnel must immediately take steps to suspend operations upon notification of an emergency requiring such actions. Tropical Storms and Hurricanes normally provide ample time to suspend laboratory operations; however, laboratories should have, and be able to execute, tropical cyclone plans. See also, Hurricane Safety for Laboratories and Power Outage and Evacuation Procedure.

6.10 Waste Disposal

Standard Operating Procedures (see Appendix A) for each laboratory must include procedures for waste disposal. Each laboratory generating hazardous waste must have at least one lab manager responsible for ensuring that all

waste generators within the lab receive annual Hazardous Waste Awareness and Handling Training. Hazardous wastes must be properly containerized, labeled and stored. Contact EH&S for pick up and disposal of hazardous wastes. Hazardous Waste Disposal Procedures for the University are outlined in the Hazardous Waste Management Procedures (See Appendix B).

6.11 Laboratory Contact Information

Each laboratory must have laboratory contact and emergency procedure information posted on the entrance to the lab and by lab telephones, when present. (See Appendix E – Forms, Checklists, and Guidance Postings for the recommended form.) Additional laboratory signage is required for work with biological and radiological materials. (See also, Biological Safety and Radiation Safety Manuals.)

6.12 Laboratory Security

When authorized laboratory personnel are not present, each laboratory must be kept locked, even if it is only for a short time. Depending on the type of work performed in a particular laboratory, it may be prudent to keep that laboratory locked at all times. Laboratory personnel must immediately, and politely, engage unknown individuals discovered in a lab in order to determine their reason for being there. A simple, "May I help you?" should get the dialog started. Immediately report suspicious individuals to University Police.

7 Exposure Control Measures

Safe work with hazardous chemicals can only be accomplished with proper control measures. Proper control measures include the use of engineering controls, appropriate storage and handling of chemicals, the use of personal protective equipment, and proper use and maintenance of safety equipment. Carefully implemented control measures can reduce or eliminate the risk of employee exposure to hazardous chemicals.

7.1 Exposure Determination

The Chemical Hygiene Officer or Industrial Hygienist shall initiate air monitoring for any regulated substance if there is reason to believe that the exposure levels for that substance exceed the action level or, in absence of the action level, the OSHA permissible exposure limit (PEL). The PEL is the eight-hour time weighted average concentration of contaminant in air to which a healthy person can be repeatedly exposed without reasonable expectation of adverse health effects. PELs for many chemicals can be found in SDSs, OSHA's "Z Tables" (29 CFR 1910.1000), and in the NIOSH Pocket Guide to Chemical Hazards.

7.2 Engineering Controls

Engineering controls include proper laboratory design, adequate ventilation, and the use of other safety devices (mechanical pipettes, safety centrifuge cups, etc.). Ventilation is the most common and most important form of engineering control used to reduce exposures to hazardous chemicals. There are two types of ventilation: general ventilation, and local exhaust.

7.2.1 General Ventilation

General ventilation for laboratory operations should be designed such that the laboratory is under a slightly negative pressure relative to other parts of the building. This prevents odors and vapors from leaving the lab. Lab ventilation should be verified by professional engineering analysis. Proper design of laboratory ventilation systems minimizes the possibility of chemical vapors accumulating.

7.2.2 Local Exhaust

Local exhaust ventilation systems are intended to capture an emitted contaminant at or near its source, before

the contaminant has the opportunity to disperse into the workplace air. In laboratories, chemical fume hoods are local exhaust devices recommended for use to reduce exposure to hazardous dusts, fumes and vapors. As a rule, the hood shall be used for all chemical procedures involving substances that are volatile and/or have a PEL less than 50 ppm. The hood sash should be closed or lowered to an appropriate working level to provide protection from chemical splashes and fires and to allow for optimal hood operating efficiency.

Fume hoods are certified annually for proper operation by EH&S. A card attached to the hood lists the tested sash height, hood face velocity, date of inspection and the inspector's initials. The recommended fume hood face velocity is between 80 to 120 linear feet per minute, and the tested sash height is indicated by a sticker on the side of the fume hood opening. Exceptions to the recommended range may be approved by EH&S on a case-by- case basis after analysis of fume hood use and containment testing. If there are problems with a hood, the FM- Service Center and EH&S should be notified. A hood is not designed to withstand explosions nor as a means of disposal for volatile chemicals. When using a fume hood, always keep your work at least 6 inches inside the hood face. This simple step can reduce vapor concentrations at the face of the hood by as much as 90 percent. See the section entitled Fume Hoods for more information on fume hood use.

Biological safety cabinets, glove boxes, and isolation rooms also provide local exhaust ventilation. These are usually very specialized pieces of equipment. Biological safety cabinets must be certified for use annually by trained and certified individuals such as manufacturer or distributor representatives. Glove boxes should be pressure tested periodically to ensure they are functioning properly.

7.3 Personal Protective Equipment

The laboratory environment contains many potential hazards. Most hazards can be reduced or eliminated by substitution and/or engineering controls. Substitution is the reduction or elimination of a hazard by replacing a high hazard material or procedure with a less hazardous one. When hazards cannot be adequately controlled with substitution and/or the implementation of engineering controls, personal protective equipment (PPE) may be required.

PPE issued to laboratory personnel must be appropriate for the task and will depend upon the proper hazard identification and assessment made by the PI. Laboratory personnel must understand the use and limitations of the PPE. PPE includes, but is not limited to, laboratory coats and aprons, eye protection (safety glasses, face shields, etc.), and gloves. Laboratory personnel must wear proper PPE when it is required.

See the Laboratory PPE Selection Guide or contact EH&S for additional information on the assessment of hazards, and the selection, and use of personal protective equipment.

7.3.1 Eye & Face Protection

The PI has many responsibilities in regard to eye and face protection, including:

- Assessing the potential for eye/face injuries due to exposure to eye or face hazards from flying particles, molten metal, chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation
- Training employees on the uses and limitations of PPE
- Providing the appropriate type of protection required
- Ensuring that the appropriate eye/face PPE is available and used by laboratory personnel.

All eye/face protection devices must meet the requirements set forth in the ANSI Z87 standard. *Note: Additional eye/face protection standards should be consulted for welding operations (29 CFR 1910.133(a)(5)) and for laser use (ANSI Z136).*

When evaluating the appropriate type of eye protection to use, it is important to note that more than one type of protection may be appropriate. In addition, multiple layers of eye and face protection may be warranted for higher-hazard operations. During the PPE selection process, the PI should consider the following:

- Safety glasses should be upgraded to splash-resistant chemical goggles whenever pouring liquid chemicals. Chemical goggles offer a much higher degree of eye protection.
- Face shields are not to be worn alone. They must only be used as a secondary means of eye and face protection with appropriate primary eye protection worn underneath. For example, chemical goggles should be worn under a face shield while pouring acids.
- Goggles come in many varieties. The right type of goggle must be selected to ensure the appropriate level of eye protection is achieved. For example, vented goggles protect the wearer from flying chips and are appropriate for cutting operations; however, the vents make them less effective as splash protection.

7.3.2 Gloves

Gloves play an important role in the safe handling of laboratory materials. Gloves must be comfortable, sufficient in length, and made of material that has the appropriate level of chemical resistance for the task to provide adequate protection. Depending on its intended use, a glove may be designed to provide dexterity, strength, low permeability, resistance to penetration by sharp objects, or protection from temperature changes.

Many factors affect the breakthrough times of glove materials including, but not limited to, thickness of glove material, concentration of the chemical, amount of the chemical contacting the glove, length of time the glove is exposed to the chemical, the temperature, and whether the glove is subjected to abrasion or puncture. Specific information on the properties of glove materials can be found in the manufacturer's permeation guide.

The following links to manufacturer permeation guides are provided for informational purposes, no endorsement is intended:

- Ansell Guardian Chemical Resistance Guide
- Cole-Parmer Safety Glove Chemical Compatibility Database
- North Chemical Resistance Guide

When using gloves follow these safety procedures:

- Make sure the glove material is resistant to the substances in use.
- Inspect gloves for holes and tears before each use.
- Wash gloves appropriately before removing them.
- In order to prevent the unintentional spread of hazardous substances, remove gloves before handling objects such as doorknobs, telephones, pens etc. and before leaving the laboratory.
- Replace gloves periodically, depending on their permeation and degradation characteristics.
- Disposable gloves designed for single use shall not be reused.

7.3.3 Respirators

The selection and use of respirators must be done in accordance with 29 CFR§1910.134 and USF's Respiratory Protection Policy. Respirators can only be used when it is not possible to minimize or eliminate exposure to a contaminant through other means. All individuals issued respirators must meet the criteria established in the OSHA standard and University Policy. These criteria include medical screening, training and fit testing. For further information, contact EH&S.

7.3.4 Lab Coats & Aprons

7.3.4.1 General

The following general directions apply to both disposable and reusable lab coats and aprons, used for chemical, biological, and/or radiological protection. All laboratory clothing shall be stored in a sanitary manner in a contamination-free area of the lab. Lab coats and aprons are not to be worn while eating or drinking, and should not be worn outside the laboratory except when transporting hazardous materials or moving between labs. The wearing of lab coats, aprons, or other potentially contaminated personal protective equipment into break areas or lunchrooms is strictly prohibited.

Lab coats and aprons that are contaminated must be handled as little as possible. They must be evaluated by laboratory personnel for laundering or disposal, depending on the nature of the contamination, and bagged or containerized at the location of use. If coats or aprons are visibly wet, they should also be placed in secondary containment to prevent the spread of contamination should the plastic bag or container leak or be otherwise compromised during storage or transport. Lab coats and aprons must not be sorted or rinsed in the location of use since the process can result in the spread of contamination and/or the uncontrolled release of contaminants down the drain. Note: Rinsing areas in labs may also be unsanitary or inadequate for laundering purposes.

7.3.4.2 Disposable Lab Coats and Aprons

Use of disposable lab coats and aprons whenever practical is strongly encouraged as these coats are low- cost and can be replaced once contaminated or otherwise soiled. Disposable, single-use coats and aprons can be placed in the trash if they have not been contaminated with chemicals, pathogens, or radionuclides.

If contaminated, lab coats and aprons shall be placed in a sealed, leak-proof, labeled plastic bag and segregated by contaminant type – chemical, radiological, or biological. Contact EH&S for pickup and disposal of contaminated, disposable lab coats, as you would with any other hazardous waste. Note: Disposable lab coats and aprons shall not be cleaned since the cleaning process can severely degrade the materials of construction, potentially allowing contamination to pass through onto clothing on reuse.

7.3.4.3 Reusable Lab Coats and Aprons Contaminated with Chemicals

Lab coats and aprons that become contaminated with chemicals must be evaluated on a case-by-case basis. Those that are contaminated with acutely hazardous chemicals or waste shall be considered hazardous waste and must not be laundered or reused. Lab coats and aprons that have been grossly contaminated with non-acutely hazardous waste may also be designated for disposal rather than laundering, depending on the chemical nature of the contaminant(s), since laundering may spread contamination and/or result in discharge of effluent that exceeds local limits. All lab coats and aprons that are designated for management as hazardous waste shall be placed in a sealed, leak-proof, labeled plastic bag, placed in the lab's waste storage area, and picked up by EH&S.

Lab coats and aprons that have been contaminated due to incidental contact with non-acutely hazardous chemicals or that have become dirty from regular use can be laundered by a commercial vendor that has expertise in cleaning lab coats, or laundered onsite at an approved facility per the Onsite Lab Coat and Apron Laundering procedures below. Note: When a department's contaminated laundry is transported off site, the department must ensure compliance with all applicable federal, state, and municipal regulations, including labeling.

FR (Flame Resistant or Flame Retardant) Lab coats must be worn when handling Pyrophoric or extremely flammable (flashpoint <73 ^{o}F) substances. These Lab coats must be cleaned by a qualified commercial vendor in order to retain the FR properties.

For added protection against exposure, fitted-wrist and snap-closure lab coats are recommended.

7.3.4.4 Reusable Lab Coats and Aprons Contaminated with Pathogens or Radionuclides

Contact Research Integrity and Compliance for procedures to be used for lab coats and aprons contaminated with pathogens or radioactive materials.

7.3.4.5 Onsite Lab Coat and Apron Laundering

Departments and/or laboratories that have their own laundering facilities must ensure that the use of these facilities does not:

- Result in the spread of contamination
- Result in the uncontrolled release of chemical, biological, or radiological contamination to the environment while lab coats or aprons are being transported, or
- Send contamination down the drain that exceeds the local wastewater treatment facility's discharge limits.

Refer to Appendix B for local sewer use discharge limits.

7.4 Proper Chemical Storage and Handling

Proper storage of chemicals is important to prevent chemical reactions that may result in fires, explosions or other safety/health hazards. Chemicals must be stored according to chemical group, not simple alphabetical order. Store chemicals of similar hazards and reactivity together. Many chemical companies provide storage codes for their products in order to assist customers with the proper storage of chemicals. Here are some general rules for safe chemical storage and handling; more specific information and resources follow.

- Store chemicals only in secure, well-ventilated areas.
- Always wear proper PPE when handling chemicals.
- Avoid floor, stairway, and hallway chemical storage (even temporary). Do not store chemicals in laboratory fume hoods. Make sure all chemicals are securely capped when not in use.
- Chemicals should be stored no higher than eye level and never on the top shelf of a storage unit.
- Shelf assemblies should be firmly secured to the walls. Avoid island shelves; however, if present, island shelves must be braced across the top to prevent tipping.
- Perform a chemical inventory at least annually. Look for unusual conditions in chemical storage areas, such as:
    - improper storage of chemicals

- leaking or deteriorating containers
- spilled chemicals
- temperature extremes (too hot or cold in storage area)
- lack of, or low, lighting levels
- blocked exits or aisles
- doors blocked open, lack of security
- trash accumulation
- smoking or open lights or matches
- fire equipment blocked, broken, or missing
- lack of information or warning signs ("No Smoking", "Flammable Liquids", "Acids", "Corrosives", "Poisons", “Chemical Storage")
- Any of these conditions should be corrected immediately. Routine inspections of chemical storage areas will prevent accidents.

➢ All chemicals should be dated upon receipt and opening. All peroxide-forming and highly reactive compounds must be dated upon receipt and upon opening.

➢ Dispose of outdated chemicals by contacting EH&S at (813) 974-4036.

7.4.1 Flammable Liquids

Flammable liquids generate vapors that can readily ignite and burn in air. To prevent a fire, these flammable vapors must not be allowed to contact an ignition source. Do not heat flammable liquids on a hot plate or open flame. Warmer temperatures increase the rate of flammable vapor production. Heat and transfer flammable liquids in well-ventilated areas or fume hoods. These substances should be stored separately from oxidizers and corrosive materials and in a flammable storage cabinet. Maximum allowable quantities associated with both the storage and open use of flammable liquids in laboratories is governed by the Florida Fire Prevention Code and Florida Building Code. Lab allowable quantity limits are determined by a complex mixture of data points including the flash point of the liquid, the occupancy classification of the laboratory, the number of fire control areas, the use of flammable cabinets, the presence of sprinklers, and the floor number. Except on higher floors (i.e. > 3rd floor) of typical laboratory buildings, a good rule of thumb is that storage of flammable liquids (including waste) outside approved flammable storage cabinets and safety cans should not exceed 10 gallons; however, exceptions may apply. Contact EH&S for additional information about the maximum allowable quantities of specific chemicals and chemical classes.

7.4.2 Corrosive Liquids

Corrosive liquids can cause serious and rapid damage to the skin, eyes, and respiratory system. They include strong acids and bases, dehydrating agents, and oxidizing agents. Corrosive chemicals should be stored in corrosion resistant cabinets, grouped by organic and inorganic families and then by related and compatible groups. If the corrosive liquid is also an oxidizer, for example hydrogen peroxide, it should be stored together with oxidizers. Nitric acid should be stored by itself away from other chemicals whenever possible. **Never store nitric acid with organic acids** (i.e. glacial acetic acid). If the corrosive liquid is also flammable, for example glacial acetic acid, it should be stored together with flammable liquids.

7.4.3 Oxidizing Agents

Oxidizing agents, in addition to their corrosive properties, can present fire and explosion hazards on contact with organic compounds or reducing agents. Strong oxidizing agents (see *Table II*) should be stored and used in glass or other inert containers. Cork and rubber stoppers should not be used with these substances.

Table II - Examples of Oxidizing Agents[1]

Gases:	Fluorine, Chlorine, Ozone, Nitrous Oxide
Liquids:	Hydrogen Peroxide, Nitric Acid, Perchloric Acid, Bromine, Sulfuric Acid
Solids:	Nitrites, Nitrates, Perchlorates, Peroxides, Chromates, Dichromates, Picrates, Permanganates, Hypochlorites, Bromates, Iodates, Chlorites, Chlorates

[1]The information in this table was taken from *Prudent Practices in the Laboratory: Handling and Disposal of Chemicals.* National Academy Press 1995.

7.4.4 Peroxide-forming Compounds

Peroxide-forming compounds (including ethers) are a group of chemicals that form shock sensitive organic peroxides upon exposure to changes in sunlight, temperature, and pressure. Store these compounds airtight and in their original containers. Class A and Class B peroxide-forming compounds should be stored under inert gas. Do not store Class C peroxide-forming compounds that have polymerization inhibitors added under inert gas. Isolate all peroxide-forming compounds in a flammable storage cabinet. Always date peroxide-forming compounds upon receipt and upon opening. Review inventory at least annually to identify containers of concern. Containers that have unusual visual characteristics such as crystallization, discoloration, or stratification should not be handled. Request that EH&S pick up any containers of concern that have been identified. Any container that tests over 30ppm peroxides and/or is not offered to EH&S for disposal in alignment with the disposal criteria in the tables below will initiate notification to the Provost's Office to order that the chemical be collected by EH&S, at which point the cost of disposal will then fall to the department. Consult resources in Section 7.4.10 for information on peroxide-forming compounds as well as additional safety information.

Class A- High hazard without concentration	Testing schedule	Criteria for disposal
Butadiene Chlorobutadiene (chloroprene) Divinyl acetylene Divinyl ether Isopropyl ether Potassium amide Potassium metal Sodium amide (sodamide) Tetrafluoroethylene Vinylidene chloride	Three months after opening. Do not test if age of chemical is unknown, evaporation Is greater than ten percent, or there is visible evidence of peroxides. Contact EH&S for disposal.	Tests greater than 0 ppm OR Greater than three months after opening OR Greater than 18 months old from the date received if unopened OR Age of chemical is unknown

Class B- Hazard upon concentration	Testing Schedule	Criteria for disposal
1,2,3,4-tetrahydronaphthalene 1,4-Dioxane 2-phenylethanol 4-Methyl-2-pentanol 4-Penten-1-OL Acetal Benzyl alcohol Cumene (isopropylbenzene) Cyclohexanol Cyclohexene Cyclooctene Cyclopentene Diaacetylene Dicyclopentadiene Diethyl ether Furan Isopropanol Tetrahydrofuran Tetrahydrofuran 99.9% Tetrahydronaphthalene Vinyl ethers	Six months after opening. Do not test if age of chemical is unknown, evaporation Is greater than ten percent, or there is visible evidence of peroxides. Contact EH&S for disposal.	Tests greater than 0 ppm OR Greater than 12 months old from the date received if opened OR Greater than 18 months old from the date received if unopened OR Age of chemical is unknown

Class C- Polymerization hazard	Testing Schedule	Criteria for disposal
Acrylic acid Butadiene Chlorotrifluoroethylene Ethyl acrylate Methyl methacrylate Styrene Vinyl acetate Vinyl chloride Vinyl pyridine	12 months from date opened if inhibited or 18 months if unopened. Do not test if age of chemical is unknown, evaporation Is greater than ten percent, or there is visible evidence of peroxides. Contact EH&S for disposal.	Tests greater than 0 ppm OR Greater than 24 hours from the date received if opened (uninhibited) OR Greater than 12 months old from the date received if opened (inhibited) OR Greater than 18 months old from the date received if unopened OR Age of chemical is unknown

Class D-Others	Testing Schedule	Criteria for disposal
Allyl phenyl ether 2-Methyltetrahydrofuran Chloromethyl methyl ether Diethyl ethoxymethylenemalonate Isophorone Lithium aluminum hydride	Six months after opening or one year from receiving date. Do not test if age of chemical is unknown, evaporation Is greater than ten percent, or there is visible evidence of	Tests greater than 30 ppm OR Greater than 18 months old from the date received if unopened OR Age of chemical is unknown

Metal hydrides Sodium Potassium Tert-Butyl methyl ether	peroxides. Contact EH&S for disposal.

7.4.5 Explosive Chemicals

Explosive chemicals are inherently unstable and can react in an uncontrolled manner liberating heat and toxic gases, which can lead to explosion. These include shock sensitive chemicals, high-energy oxidizers, and peroxide-formers. The presence of heat, light, mechanical shock, or catalysts can trigger a reaction. Reactive chemicals should be stored on low shelving, preferably in secondary containment but never on the floor. Always date explosive chemicals upon receipt and upon opening.

The following additional procedures are recommended for handling explosive chemicals:

- Secure reaction equipment properly
- Use impact protection (shields and guards) in addition to chemical splash protection (eye protection, gloves, laboratory coat, etc.)
- Handle shock-sensitive chemicals gently to avoid friction, grinding, and impact

Consult resources in Section 7.4.10 for information on explosive chemicals as well as additional safety information.

7.4.6 Toxic Chemicals

Highly toxic chemicals should be handled only by trained individuals and stored in a dedicated, labeled, and locked Toxics/Poisons cabinet. Experiments must be well planned and take place only in designated areas with limited access. Some examples of these compounds include dimethyl mercury ((CH3)2Hg), thallium (III) oxide (Tl2O3), and hydrofluoric acid (HF).

7.4.7 Crossover Properties

Many chemicals found in the laboratory exhibit properties common to more than one of the previously mentioned groups (for example, ether). For each chemical, one should simultaneously follow the safety guidelines for all applicable hazard groups. Contact EH&S for additional information about the storage of specific chemicals.

7.4.8 Storage in Refrigerators, Freezers, and Cold Rooms.

All refrigerators/freezers/cold rooms located in laboratory areas must be clearly marked as to their contents. An inventory list should be posted on the outside of the refrigerator/freezer/cold room. Refrigerators/freezers/cold rooms used for chemical storage must be marked "Chemical Storage Only! No Food!" Flammable chemicals must not be stored in a refrigerator/freezer/cold room unless the refrigerator/freezer/cold room is specifically designed and approved for flammable storage. Refrigerators/freezers/cold rooms located in break rooms or lunchrooms, and which are located near laboratories, should be marked "Food Storage Only! No Chemicals!" Refrigerators/freezers/cold rooms in laboratory work areas must not be used for food storage.

Cold rooms, or walk-in coolers, are typically used for storage of larger items or bulk storage of culture media and reagents that must be kept refrigerated. Storing these materials long-term in their shipping containers can propagate mold, which can then contaminate the surroundings and pose a health hazard. To avoid this, all paper, cardboard, absorbent materials (paper towels and diaper paper), wood, and Styrofoam is prohibited from cold rooms unless EH&S has given permission. Remove materials from shipping containers and place in sealed plastic

bins labeled with pertinent information like lot numbers and expiration dates. Clean spills and remove wet materials immediately.

The cost of any necessary remediation resulting from failure to remove cardboard from refrigerators/freezers/cold rooms will fall to the responsible Department or College.

7.4.9 Labeling

All containers (including beakers, vials, flasks, etc.) must be identified in a way that is understandable to laboratory workers and others who may need to be able to recognize the contents. This includes dilute as well as stock solutions. Whenever possible, chemicals should remain in their original containers with the original labels intact. If a chemical is transferred from its original container, the new container must have the full name of the chemical, written out in English, and appropriate GHS Pictogram(s). Do not rely on abbreviations, acronyms, chemical

formulas, and chemical structural diagrams as the sole source of information on container labels. Damaged or faded labels must be replaced before becoming illegible.

7.4.10 Hazardous Chemical Resources

Presented below are several excellent resources to assist in the proper storage and handling of hazardous chemicals.

- CAMEO Chemical Reactivity Tool
- Prudent Practices in the Laboratory: Handling and Disposal of Chemicals (1995)
- Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards (2011)
- Guidelines for Explosive and Potentially Explosive Chemicals Safe Storage and Handling (UC-Berkley)
- Laboratory Chemical Safety Summaries (LCSS)

7.5 Moving Chemicals on Campus

Whenever chemicals are moved between labs or storage rooms in the same building, between buildings, or even across campus, the use of secondary containment or overpacking is required as an added safety precaution. Both secondary containment and overpacking help mitigate the adverse effects of a spill or an in-transit container failure by reducing the likelihood of environmental releases and the probability and severity of exposure to harmful chemicals. For those chemicals that are immediately dangerous to life and health (IDLH) when spilled, overpacking is required. When practical, additional secondary containment may also be used in conjunction with overpacking to provide an added level of protection.

Chemicals may not be transported in personal vehicles, nor may chemicals be transported outside of campus boundaries without EH&S approval.

Note: For the purposes of this section, secondary containment refers to open top bins, pails, containers, trays, etc. that are moved in an upright position. Overpacking refers to closed top/encapsulating packaging that can hold its contents even if tipped over.

7.5.1 Secondary Containment

The form of secondary containment that is most widely used at the University consists of durable plastic bins. This baseline level of containment is required when moving liquid chemicals and is strongly recommended when moving solid chemicals as well. Solid chemicals may also be moved in cardboard boxes of rigid construction that have completely closed and properly sealed bottoms. For compressed gases contained in lecture bottles, plastic pails serve as an adequate baseline level of containment. Secondary containment is not used for large DOT-approved compressed gas cylinders. Guidance for transporting DOT cylinders can be found in the Compressed Gas Cylinder Section of this CHP.

In all cases, the secondary containment selected must be constructed of material that is compatible with the chemical(s) being moved. The secondary containment must also be strong enough to hold all containers without excessive flexure, and must have enough volume to hold the contents of all containers without overflowing in the event of container failure. As needed, spill pads, cardboard inserts, or bubble wrap can be used to prevent bottles from bumping together while being moved. This practice helps minimize the potential for bottle breakage.

7.5.2 Overpacking

Overpacking is the practice of placing a chemical container within a larger, often padded, sealable container to increase the level of protection in the event of a spill or container failure while being moved. The original DOT-compliant packaging, used to ship the chemical on initial purchase, can always be used as an overpack as long as the outer packaging is in good condition and includes all original inner packaging materials, such as plastic liners, absorbent materials, foam padding, etc. A basic overpack consisting of a larger sealable container, of construction compatible with the chemical being moved, and packed with spill pads, is easily made and effective for most chemicals when the original vendor packaging is unavailable, incomplete, or damaged.

In order to determine when overpacking is required, the degree of severity of the hazard posed while moving a chemical must be fully understood. The degree of severity of a hazard is a function of a chemical's hazard classification, amount being moved, and relative concentration in mixtures or solutions. Note: Consideration must also be given to the route traveled, weather conditions (if moving chemicals outdoors between buildings), and potential for the presence of other people along your chosen path.

7.5.3 Hazard Classification

The safety data sheet (SDS) for a chemical can be a valuable tool in evaluating the need for overpacking. Section 2, "Hazards Identification," of GHS-compliant SDSs provides the GHS hazard classifications and category numbers for all pertinent chemical(s) of concern. Under the GHS system, the lower the hazard category number, the higher the hazard. As a rule of thumb, as the GHS hazard number decreases, the need for additional care while moving chemicals and the necessity for overpacking both increase. Any chemical that is IDLH (explosive/shock sensitive, pyrophoric, water reactive or a strong lachrymator) requires overpacking. Those chemicals that have a GHS hazard category of 1 for the following hazard classifications are also considered IDLH and require overpacking:

- Acute toxicity (any route – inhalation, skin absorption, ingestion, or injection)
- Skin corrosion
- Serious Eye Damage

For those chemicals that are GHS hazard category of 2 or 3, overpacking may be appropriate as an added level of protection beyond the baseline practice of using secondary containment. This determination needs to be made on a case-by-case basis and depends on the amount being moved and concentration. GHS hazard category 4 or 5 chemicals do not typically require overpacking; however, they can be overpacked, for added protection, at the discretion of the responsible person.

7.5.4 Amount Being Moved

The amount of chemical being moved can also have an impact on the need for overpacking. Generally, moderate hazard chemicals (with a GHS hazard category of 2 or 3) will not require overpacking if moved in limited quantities, as long as secondary containment is used. If larger amounts of chemicals are to be moved, overpacking should be considered to increase the overall level of protection.

A good example in considering amount as a deciding factor can be found with a chemical such as hexane. Hexane has a hazard category of 2 or 3 for all relevant GHS hazard classifications. When a small bottle of hexane is to be moved, secondary containment is usually adequate. When several 4-liter bottles of hexane are to be moved, overpacking is strongly recommended. In this case, the shipper's original packaging, or a liquid tight container(s) padded with spill pads would both be appropriate.

7.5.5 Concentration

The concentration of a chemical in a solution also plays a significant role in determining the need for overpacking. For those chemicals with a GHS hazard category of 1 that are in solution, concentration is almost directly proportional with the need for overpacking, *i.e.* as concentration increases, so does the necessity of overpacking prior to moving chemicals from place-to-place.

A classic example of how concentration affects the need for overpacking can be found with a chemical such as hydrochloric acid (HCl). Fuming HCl (>37% by volume) has a hazard category of 1 for both serious eye damage and skin corrosion. When the concentration is decreased to 0.1M, the skin corrosion hazard significantly decreases and the hazard category of 1 only remains for serious eye damage. When HCl concentration is further reduced to 0.01M, HCl no longer has a hazard category of 1 for any hazard classification. Fuming HCl should always be overpacked, in the shipper's original packaging or wrapped in spill pads and placed in a larger sealable jar of compatible construction, when moved. A dilute 0.01M HCl solution requires no overpacking and can be moved in a plastic secondary containment bin, like any other low to moderate hazard liquid.

The chart below is provided as a guide to understand when secondary containment and overpacking should be used. Contact EH&S (813-974-4036) if further assistance is required.

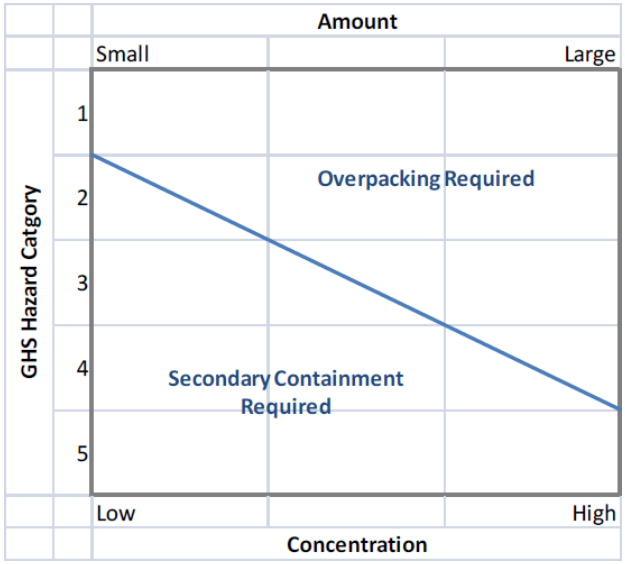

Chart 1: Secondary Containment vs. Overpacking

7.6 Shipping of Hazardous Materials

To assure the safe transport of hazardous materials, the University *must* comply with the United States DOT Hazardous Materials Regulations (49 CFR §171-180). These regulations cover the shipping and transport of hazardous materials such as, but not limited to, infectious substances, toxins, flammables, and explosives. They also contain specific packaging and labeling requirements, and require that all individuals who ship hazardous materials be trained in the proper packaging, labeling, and shipping of such goods.

Hazardous Materials are defined as, "substances or materials that are capable of posing a significant risk to health, safety, or property when transported." University employees may not be involved in the shipping of hazardous materials, *unless* they have received training, which enables them to properly pack and label hazardous materials and correctly complete the required shipping papers. Laboratories shipping hazardous chemicals must also provide a Safety Data Sheet to outside entities who will receive the hazardous chemicals. Contact EH&S to obtain the required training or for assistance in shipping hazardous materials off campus. (See Appendix C: Hazardous Materials Shipping/Receiving Guide).

7.7 Safety Equipment

In most cases, the following safety items should be readily available in laboratories: fire extinguishers, eyewash/safety showers, spill kits/absorbents, first aid kits, and a telephone with emergency numbers posted. Consult EH&S for assistance in determining safety equipment needs for a particular laboratory.

EH&S performs monthly fire extinguisher inspections. Annual maintenance inspections of fire extinguishers are performed by a licensed fire extinguisher service contractor. Discharged, overcharged, or missing fire extinguishers need to be reported immediately to EH&S. Eyewash units must be flushed weekly by laboratory personnel. Safety showers will be flushed quarterly by FM-Operations. FM-Operations will complete annual maintenance inspections on all eyewash/safety shower units. In order to verify operation and accessibility, laboratory personnel should check all other safety equipment at least once a week as well. Fume hoods are inspected annually by EH&S (see the section on Fume Hoods).

Malfunctioning eyewash/safety showers and fume hoods should be reported immediately to the FM-Service Center. If the safety equipment is not repaired promptly, please call EH&S at 813-974-4036. Laboratory operations

should be restricted until safety equipment is repaired; no chemical work is to be performed in a malfunctioning fume hood.

Spill Kits and First Aid Kits are to be maintained by individual laboratories or departments. Minimum equipment requirements for spill kits can be found in Appendix D: Hazardous Materials Emergencies and Spills. Emergency contact numbers can also be found in Appendix D.

8 Fume Hoods

The fume hood is one of the primary safety engineering controls in the laboratory. EH&S will (1) be responsible for the annual inspection and certification of fume hoods, (2) monitor the preventive maintenance program for the fume hoods and (3) coordinate the approval and placement of new (or used) fume hoods in the laboratory. The purpose of the fume hood is to remove toxic fumes or contaminants from the breathing zone of the user. There are two basic categories of fume hoods: *General Purpose* and *Special Purpose*.

8.1 General Purpose Hoods

These hoods are used for laboratory work with materials that do not require special handling procedures. A general-purpose fume hood can be one of four types: (1) Conventional Hood, the basic hood with a movable sash and baffle. This hood is generally the least expensive and its performance depends mainly on the position of the sash. (2) By-Pass Hood, designed to allow some exhaust air to "by-pass" the face of the hood even when the sash is closed. It is designed for use with sensitive and fragile apparatus and/or instruments. (3) Auxiliary Air Hood, designed to introduce outside air into the hood and limit the amount of room air that is exhausted. (4) Variable Air Volume (VAV) Hood, designed to regulate the hood exhaust and keep the air velocity at a predetermined level.

8.2 Special Purpose Hoods

Certain research activities involve the use of substances that can create dangerous conditions or have clearly defined health hazards. These activities will require specially designed fume hoods to deal with these unique conditions. The most common special purpose fume hoods are perchloric acid and radioisotope fume hoods.

8.2.1 Perchloric Acid Hoods

Procedures with perchloric acid must never be done in a regular fume hood. Special perchloric acid hoods must be used. An exception can be made in the case of infrequent use of small quantities of perchloric acid. Hoods not specifically designed for use with perchloric acid may be approved for use by EH&S if the vapors are trapped and scrubbed prior to release into the hood. EH&S must be contacted to request review and approval prior to use.

Perchloric acid hoods are generally made of non-corrosive materials (stainless steel), and are equipped with a water wash down mechanism in the ductwork. Perchloric acid fume hoods must be clearly labeled and used only for perchloric acid or other mineral acids, such as nitric, hydrochloric, and hydrofluoric. **No organic solvents should be stored or used in these hoods**. When perchloric acid is heated above ambient temperature, vapor is formed which can condense in the ductwork and form explosive perchlorates. After each use, the fume hood operator shall wash down the hood and ductwork with water.

8.2.2 Radioisotope Hoods and Biological Safety Cabinets

Contact Research Integrity & Compliance for information about these hoods and cabinets.

8.3 General Safety Practices for Fume Hoods

- Fume hoods are *not* designed for storage. Items (equipment, chemicals, etc.) within the fume hood should be minimized as they can reduce fume hood performance. Remove all items not required for procedures in progress.
- Fume hoods should be equipped with "Magnehelic" gauges or flow meters with low flow alarms to ensure that the hoods are functioning properly. In the absence of gauges or meters, a convenient test method is to use a tissue paper streamer attached to the bottom of the sash.
- **Do not ignore or defeat fume hood flow alarms. Submit a work request to the FM-Service Center and notify EH&S.**
- All work should be at least six inches behind the sash opening of a fumehood.
- Any items within a hood must not obstruct the baffle openings or impede airflow at the face of the fume hood.
- Fume hoods should be operated with sashes lowered whenever possible and closed when not in use.
- Fume hood baffles are set to exhaust equally from the top, middle, and bottom zones of the hood. Baffle adjustments should only be made after consultation with EH&S.
- Fume hoods may fail for a variety of reasons. Lab personnel should have a contingency plan for hood failure to prevent development of hazardous conditions, and to avoid interruptions in laboratoryuse.

9 Local Exhaust Enclosures and Snorkels

Local exhaust enclosures and snorkels are only appropriate for use with low-hazard materials. These devices are not an appropriate substitute for fume hoods or biosafety cabinets, which have significantly higher capture efficiencies. Use of local exhaust enclosures or snorkels with moderate- to high-hazard materials can result in serious injury or death.

Local exhaust enclosures and snorkels may be used to help an already-effective general ventilation system achieve the following:

- Control of nuisance-level dust, fume, and vapor in labs and other work spaces
- Enhanced removal of low-hazard airborne contaminants
- Increased worker comfort

Contact EH&S if you require assistance in determining the suitability of local exhaust enclosures or snorkels for your specific application.

10 Employee Information and Training

An essential component of the CHP is providing information and training to all laboratory workers. Providing information and training ensures laboratory workers are aware of the hazards posed by the chemicals in their work areas, and how they may protect themselves from those hazards.

All employees will be informed and trained about the hazards in their work areas at the time of initial assignment and prior to work involving new exposure situations. Refresher training will occur annually or as otherwise required.

10.1 Employee Information

Laboratory workers will be informed of, and provided immediate access to the following:

- Contents and appendices of the "OSHA Lab Standard" (29 CFR§1910.1450).
- Contents and appendices of the CHP.
- Mandatory and recommended exposure limits for hazardous chemicals.
- The signs and symptoms associated with exposures to hazardous chemicals.
- The location and availability of safety reference materials for hazardouschemicals, including SDSs.

10.2 Employee Training

At a minimum, employee training will include:

- Methods used to detect the presence or release of hazardouschemicals.
- Physical and health hazards of chemicals in the work area.
- Protective measures used to reduce hazards or exposures.
- Applicable details of the CHP.

10.3 Information and Training Responsibilities

To satisfy the information and training requirements outlined above; laboratory workers must, at a minimum, complete Laboratory & Research Safety training. EH&S provides this and other trainings to departments upon request and as otherwise scheduled. Additional training requirements may apply. Consult the Safety Training Needs Assessment and the Laboratory Safety Training Matrix for details. EH&S will document and maintain records of such training and assist departments in tracking their refresher training needs.

Departments must identify laboratory workers, who require training and ensure workers attend training sessions, including refresher training. Principal investigators and lab managers must also provide on-the-job, lab specific safety training to laboratory workers.

11 Activities Requiring Prior Approval

In order to protect the health and safety of laboratory employees, building occupants and the community at large, certain laboratory activities will require prior approval from the designated approval body. Table III provides a summary of activities and the bodies within the University responsible for granting approvals for those activities.

Table III Activities and Approving Bodies

Activity	Approving Body
Research grant proposals involving: hazardous chemicals[A], radioisotopes, x-rays, lasers	Environmental Health & Safety Research Integrity & Compliance
Research involving: human/primate blood, tissues, human, animal and plant pathogens, and recombinant DNA.[A]	Institutional Biological Safety Committee, Institutional Review Board (involving human subjects)
The use of laboratory animals[B]	Institutional Animal Care and Use Committee (IACUC)
New experimental protocol procedures	Principal Investigator, Lab Manager[C]
Change(s) to existing protocol procedures	Principal investigator, Lab Manager[C]
Unattended operations	Principal investigator, Lab Manager

Activity	Approving Body
Working alone in the laboratory[D]	Principal investigator, Lab Manager

[A] Research grant proposals can be used to receive notice of these activities.
[B] Animal Care and Use Committee reviews work when the Principal Investigator applies.
[C] And appropriate committee(s) based on type of work performed (i.e., RSC, IACUC, IBC, IRB, etc.).
[D] Prohibited activity: A laboratory worker may not work alone in a laboratory while working with substances of unknown or high toxicity.

12 Medical Consultations/Examinations

Employees should contact EH&S whenever there is a suspected exposure to a hazardous chemical in the laboratory. All accidents, injuries, or incidents must be reported to the supervisor or other person in charge. Accidents and injuries resulting in the need for first aid, medical attention, or lost work-time must be documented. Persons responsible for the affected individual(s) must complete the appropriate report. (See the USF Reporting Procedures.)

If, in the course of an exposure investigation by EH&S, monitoring reveals an exposure level routinely above the action level (or permissible exposure level, "PEL"), as prescribed by the 29 CFR 1910 standard that applies to the substance being investigated, then medical surveillance will be established for the affected employee.

Employees will also be provided the opportunity for a medical consultation in the event of a spill, leak, or other potential hazardous exposure occurrence. Such consultation will be used to determine the need for a medical examination. Some of the chemicals used in the laboratory are OSHA regulated and have exposure monitoring and medical surveillance requirements. These requirements are activated when the concentrations of these chemicals meet or exceed exposure levels determined by OSHA.

All consultations/examinations will be conducted or supervised by a licensed physician. These consultations and/or examinations will be provided to the employee at no cost. The employee will be directed to an appropriate medical facility by the University's Managed Care Provider as required by State Worker's Compensation requirements.

In cases where laboratory employees seek medical attention for possible overexposure to hazardous chemicals, the PI, supervisor, or lab manager must provide the following information to the attending physician:

- The identity of the hazardous chemical(s) to which the employee may have been exposed;
- A description of the conditions under which the exposure occurred including quantitative exposure data, if available; and,
- A description of the signs and symptoms of exposure that the employee is experiencing, if any.

If possible, a copy of the Safety Data Sheet(s) for the chemical(s) involved should also be given to the physician. All incidents of overexposure must be fully documented (see the USF Reporting Procedures).

For any consultation/examination provided under this program, the person responsible for the employee must ensure that the attending physician provides a written opinion regarding the case to EH&S. These medical documents shall be stored in a locked file cabinet in a room that is also locked when unoccupied. The written opinion must include the following:

- Any recommendations for further medical follow-up;
- The results of the medical examination and any associated tests;
- Any medical condition which may be revealed in the course of the examination which may place the

employee at increased risk as a result of exposure to a hazardous chemical found in the workplace; and,
- A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

The written opinion must not reveal specific findings or diagnoses that are unrelated to the occupational exposure.

Any written opinion from a physician will be treated as confidential medical records and will not be released to third parties without the prior written consent of the employee. Any releases will be logged for tracking purposes. The log will indicate where health records were sent, even if a copy is released to the employee.

13 Particularly Hazardous Substances

Additional protective measures must be implemented in areas where Particularly Hazardous Substances (i.e., OSHA "select carcinogens," reproductive toxins, and substances with a high degree of acute toxicity) are used. The PI bears the ultimate responsibility for the safe use of particularly hazardous chemicals in the laboratory. Researchers must create a Designated Area in the laboratory that is physically separated and visually labeled with appropriate warnings. Access to Designated Areas must be strictly controlled. Engineering controls (such as fume hoods and biosafety cabinets) must also be located in these areas. Some additional measures to be followed include:

- Abiding by good industrial/chemical hygiene practices (i.e., no eating drinking or tobacco products, wash hands, use of proper PPE, etc.).
- Properly handling and storing waste.
- Using appropriate procedures for decontamination.

The PI using particularly hazardous substances (as defined above) will be responsible for submitting a Standard Operating Procedure (SOP) to EH&S for review before the "Designated Area" may become active. The SOP must outline the methods that will be used, the proper handling of chemicals in the "Designated Area" and access restrictions to the area. Researchers should consult the SOP information described in Appendix A of this document to complete their SOPs. Contact EH&S with additional questions or concerns.

13.1 Guidelines for Handling Some Specific Hazardous Chemicals

The guidelines that follow, taken from Appendix A of the OSHA Lab Standard (29 CFR§1910.1450), should be adhered to when working with hazardous chemicals of a specific nature. For additional information on the handling, storage or disposal of any of these chemicals, contact EH&S.

13.1.1 Allergens and Embryotoxins

Allergens (diazomethane, isocyanates, and dichromate's) can produce varying degrees of symptoms in the body depending upon individual susceptibility. Lab workers should wear suitable PPE (gloves, lab coats, safety glasses, respirators, etc.) to prevent hand contact with allergens or substances of unknown allergenic activity.

Embryotoxins (organomercurials, lead compounds, formamide) can have degenerative and toxic effects on developing embryos. Women of childbearing age must handle these substances only in a glove box or hood with satisfactory performance. They must also use appropriate protective apparel (gloves, lab coats, etc.) to prevent skin contact.

In addition to these guidelines, the following practices should be instituted when working with allergens and embryotoxins:

- Review the use of these materials with the research supervisor.
- Review procedures annually, or whenever a procedural change is made.
- Store these substances in an unbreakable secondary container, properly labeled, and in an area that is secured (capable of being locked) and adequately ventilated.
- Notify supervisors of all incidents of exposure or spills. Consult a qualified physician when appropriate.

13.1.2 Chemicals of Moderate Chronic or High Acute Toxicity

Certain chemicals have been identified as causing acute and/or chronic health effects. Substances of high acute toxicity cause immediate health effects at very low concentrations. Some examples of chemicals with high acute toxicity include the gases hydrogen cyanide, phosgene, and arsine. Substances that have moderate chronic toxicity may cause adverse health effects after repeated exposure over time. These may include carcinogens, teratogens, mutagens, and sensitizers. These supplemental rules should be followed in addition to those for allergens and embryotoxins:

- Aim: To minimize exposure to these toxic substances by any route using all reasonable precautions.
- Applicability: These precautions are appropriate for substances with moderate chronic or high acute toxicity.
- Location: Use and store these substances only in areas of restricted access with special warning signs.
- Containment: Always use a hood (previously evaluated to confirm adequate performance with a face velocity of 80-120 feet per minute) or other containment device for procedures that may result in the generation of aerosols or vapors. Trap released vapors to prevent their discharge.
- Personal protection: Avoid skin contact by use of gloves and long sleeves (and other protective apparel as identified in the SDS or other safety document). Always wash hands and arms immediately after working with these materials.
- Records: Maintain records of the amounts of these materials on hand, amounts used, and the names of the workers involved.
- Prevention of spills and accidents: Be prepared for accidents and spills. Assure that at least two people are present at all times if a compound in use is highly toxic or of unknown toxicity. Store breakable containers of these substances in chemical resistant trays. Work (including instrumentation areas) and storage areas should be covered with removable, absorbent, plastic backed paper.
- If a major spill occurs outside the hood, evacuate the area. Contact EH&S as soon as possible. Cleanup personnel must wear suitable protective apparel and equipment.
- Waste: Thoroughly decontaminate/dispose of containers, labware, and contaminated clothing or shoes in accordance with directions from EH&S. Store contaminated waste in closed, properly labeled, impervious containers. Ensure that absorbent material is used to prevent breaking of containers and to absorb any leakage. All materials used must be compatible with the chemicals in the container.

13.1.3 Chemicals of High Chronic Toxicity

These chemicals can produce severe chronic effects in very low doses. Some examples include dimethylmercury and nickel carbonyl, benzo-a-pyrene, and N-nitrosodiethylamine.

Further supplemental rules to be followed, in addition to all those mentioned above, for work with substances of known high chronic toxicity (in quantities above a few milligrams to a few grams, depending on the substance as identified in an SDS or other safety document, include the following:

- Access: Conduct all transfers and work with these substances in a "Designated Area." A Designated Area is a restricted access hood, glove box, or portion of a lab, designated for use of highly toxic substances. Make sure all people with access are aware of the substances being used and of the necessary precautions.
- Approvals: Prepare a plan for the use and disposal of these materials, and obtain EH&S approval.
- Non-contamination/Decontamination: Protect vacuum pumps against contamination by scrubbers or HEPA filters and vent them into the hood. Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the hood before removing them from the Designated Area.
- Decontaminate the Designated Area before normal work is resumed there, based on guidance from EH&S, SDS, and/or other sources of information.
- Exiting: On leaving a Designated Area, remove any protective apparel (placing it in an appropriate, labeled container) and thoroughly wash hands, forearms, face, and neck.
- Housekeeping: Use a wet mop or a vacuum cleaner equipped with a HEPA filter. Avoid dry sweeping powder if the substance was toxic.
- Medical surveillance: If using toxicologically significant quantities (as identified by (M)SDS or other source of safety information) on a regular basis (e.g. 3 times per week), consult a qualified physician concerning regular medical surveillance. If medical surveillance is recommended, consult with EH&S.
- Records: Keep accurate records of the amounts of these substances stored and used, the dates of use, names of users, and disposal records.
- Signs and labels: Assure that the Designated Area is conspicuously marked with warning and restricted access signs. Keep all containers appropriately labeled with chemical name and hazard, i.e. "Toxic or Poison."
- Spills: Assure that contingency plans, equipment, and materials to minimize exposures of people and property in case of accident are available.
- Storage: Store containers of these chemicals only in a ventilated, limited access area in appropriately labeled, unbreakable, chemically resistant, secondary containers.
- Glove boxes: For a negative pressure glove box, ventilation rate must be at least 2 volume changes/hour and pressure at least 0.5 inches of water (gauge). For a positive pressure glove box, thoroughly check for leaks before each use. In either case, trap the exit gases or filter them through a HEPA filter and then release them into the hood exhaust. HEPA filters must be evaluated and replaced as necessary by competent laboratory staff. Filters must be disposed of in accordance with hazardous waste regulations. Contact EH&S for additional information.
- Waste: Use chemical decontamination whenever possible; ensure that containers of contaminated waste (including washings from contaminated flasks) are transferred from the Designated Area in a secondary container under the supervision of authorized personnel.

13.1.4 Working with Perchloric Acid

Perchloric acid solutions shall not be evaporated or heated unless the process takes place in a designated perchloric acid fume hood. These special fume hoods are designed in such a way as to allow systematic wash downs with water after using perchloric acid. The evaporation of perchloric acid leads to the formation of highly explosive

anhydrous perchloric acid being deposited on the surfaces of ducts. Additionally, evaporated perchloric acid can form equally explosive metallic perchlorate compounds in ductwork.

An exception can be made in the case of infrequent use of small quantities of perchloric acid. Hoods not specifically designed for use with perchloric acid may be approved for use by EH&S if the vapors are trapped and scrubbed prior to release into the hood. EH&S must be contacted to request review and approval prior to use.

13.1.5 Conducting Procedures with Hydrofluoric Acid

Hydrofluoric acid (HF) is a corrosive material that is dangerous even at low concentrations (50-250ppm) and brief exposure times. Skin contact causes serious skin burns which may not be immediately apparent or painful since HF interferes with nerve function, initially blocking pain. Symptoms may be delayed 8 hours or longer, resulting in deep acid penetration and severe burns. The fluoride ion readily penetrates the skin causing destruction of deep tissue layers and bone. Systemic fluoride poisoning has been associated with sudden death due to cardiac arrest, which can occur with burns to as little as 2.5% of body surface area. Inhalation of HF vapor may cause ulcers of the upper respiratory tract and can lead to systemic fluoride ion poisoning.

HF should be used in an operational chemical fume hood. In addition to a chemical fume hood, customary PPE including an apron or lab coat, close-toed shoes, goggles, and nitrile gloves, a full-face shield and heavy neoprene over-gloves are required. HF is usually stored in polypropylene containers since it attacks glass and other silicon containing compounds. NOTE: HF reacts with silica to produce silicon tetrafluoride, a poisonous, corrosive gas known to cause pneumonitis and pulmonary edema. Older polypropylene containers can become brittle or start to bubble. If such a container is found, contact EH&S immediately. If concentrated HF contacts the skin call 911 immediately and inform medical personnel that a hydrofluoric acid exposure has occurred; also, inform EH&S of the exposure incident.

Labs using hydrofluoric acid must have a supply of either calcium gluconate gel (preferred), or a 10% W/V calcium gluconate solution on hand as an antidote. Topical applications of the gel or solution should be applied frequently and liberally while the victim is awaiting further medical attention. Call EH&S for more information.

13.1.6 Nanomaterials

Anyone who uses nanomaterials in research may potentially be exposed to resultant nanoparticles through inhalation, dermal contact, or ingestion, depending upon how nanomaterials are used and handled. Although the potential health effects of such an exposure are not fully understood, scientific studies indicate that at least some of these particles are biologically active, may readily penetrate intact skin, and have produced toxicological reactions in the lungs of exposed animals.

It is important to note that the properties of engineered nanomaterials differ substantially from those of the same material in bulk or macro-scale form. Properties that may be important in understanding the toxic effects of nanomaterials include particle size and size distribution, agglomeration state, shape, crystal structure, chemical composition, surface area, surface chemistry, surface charge, and porosity.

Research involving the use and/or development of nanomaterials may carry with it the following potential health risks:

- Toxicity of nanoparticles is likely greater than that of the same mass of larger particles.

- Granulomatous pneumonia, fibrosis and other nonmalignant respiratory diseases could result from exposure to nanoparticles.
- Exposure to metal and metal oxide nanoparticles could result in DNA damage.
- Certain nanoparticles may be human carcinogens.

In addition to the health risks above, when dispersed in air, nanoparticles may pose a risk of flash fires or "dust" explosions in the presence of flames or sparks.

Prior to working with nanomaterials, implement appropriate control measures, and develop SOP(s). Laboratory best practices must also be observed to effectively minimize or eliminate exposure to nanoparticles. Notify EH&S if you plan to use nanomaterials.

Appendix A: Standard Operating Procedures (SOPs)

A-1 Components of an SOP

1. **Contact information for lab (names, location, and phone numbers)**
   This information must be kept current.
2. **Description of process/equipment, hazardous chemical or hazard class**

   - Process/Equipment - Describe the hazardous process and/or equipment. List all hazardous chemicals and/or equipment used in the process.
   - Hazardous Chemical - Name the hazardous chemical for which the SOP is being developed. Include International Union of Pure and Applied Chemistry (IUPAC), common name, and any abbreviation(s) used for the chemical.
   - Hazard Class - Describe the hazard associated with a particular group of similar chemicals and list the chemicals used in the laboratory.
   - Provide a step-by-step procedure for how to properly and safely conduct the activity. Include hazard controls from the Hazard Assessment.
3. **Hazard Summary**
   Use the list of hazards from the Hazard Assessment. SDS's, primary literature, your PI/Lab Supervisor, and other references like instruction manuals are resources to provide more information about each hazard.
4. **Special handling and storage requirements**
   Include general precautions on how to minimize hazards associated with this activity. Include if the activity must be conducted in designated areas.
5. **Engineering and ventilation controls**
   If activity must be performed in the fume hood, under a snorkel, or paint booth, state that here. If other engineering controls are in place (such as barriers or guards), mention them. If the activity cannot be performed in a fume hood, contact EH&S for a ventilation assessment.
6. **PPE**
   List personal protective equipment required. Be specific. Reference SDS's and glove compatibility charts. Describe where PPE can be found in the lab, how to put it on, how to take it off, how to clean it, and how to dispose of it.
7. **Emergency procedures**
   Describe what to do in case of spill, fire, exposure to skin/eyes/inhalation, and injury. Provide locations of first aid kit, spill kit, safety shower, eyewash, emergency numbers and fire extinguisher. Describe how to report incidents, near misses, and workers' compensation cases.
8. **Waste disposal**
   Describe how to dispose of the waste produced from this activity. Waste must be segregated by hazard class in appropriate containers. Refer to SDS's, primary literature, your PI/Lab Supervisor, and other references for specific information. Use CHEMATIX to request waste pickups and waste containers.
9. **Training requirements**
   List training requirements. Everyone working in a lab where chemicals are used or stored must complete EH&S Lab Safety Training every year. Other training may be required. They may include Biosafety, Laser, Radiation, and X-Ray safety.
10. **Prior approvals**

If the PI/Lab Supervisor must approve the activity, indicate it here. Also indicate if working alone is permitted.

11. **Certification Sheet**

    Everyone must read the SOP for an activity and sign to indicate they understand it before beginning work. The PI or Lab Supervisor must approve the SOP with their signature and the date on the s page.

A blank template is on the next page. Template SOPs with basic information already filled out are available in the EH&S website.

A-2 STANDARD OPERATING PROCEDURE TEMPLATE

CONTACT INFORMATION		
Location	Building:	Room:
Street Address:		
Lab Safety Contact:	Name:	
	Lab Phone:	Office Phone:
Emergency Contact	Name:	Phone:

TYPE OF STANDARD OPERATING PROCEDURE

Indicate which type of Standard Operating Procedure applies

☐ Specific Process or Equipment

☐ Specific Hazardous Chemical

☐ Hazard Class for a Group of Chemicals

DESCRIBE PROCESS/EQUIPMENT, HAZARDOUS CHEMICAL or HAZARD CLASS

Process/Equipment - Describe the hazardous process and/or equipment. List all hazardous chemicals and/or equipment used in the process.

Hazardous Chemical - Name the hazardous chemical for which the SOP is being developed. Include International Union of Pure and Applied Chemistry (IUPAC), common name, and any abbreviation(s) used for the chemical.

Hazard Class - Describe the hazard associated with a particular group of similar chemicals and list the chemicals used in the laboratory.

Provide a step-by-step procedure for how to properly and safely conduct the activity.

HAZARD SUMMARY

List physical, chemical, and health hazards associated with the chemical, chemical class, process, or machine.

SPECIAL HANDLING AND STORAGE REQUIREMENTS

Include general precautions on how to minimize hazards associated with this activity.

ENGINEERING AND VENTILATION CONTROLS

Specify if the activity must be conducted using a fume hood, snorkel, or paint booth; or in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT

PPE Requirements:

☐ Long pants or clothing that covers all skin below the waist

☐ Shoes that cover the entire foot

☐ Gloves; indicate type: Click here to enter text.

Inspect gloves before use. Use proper glove removal technique to avoid skin contact with outer surface of glove. Wash hands after removing gloves.

☐ Safety goggles

☐ Safety glasses

☐ Face shield

☐ Lab coat

☐ Flame-resistant lab coat

☐ Other: Click here to enter text.

If the use of an N95, half mask, or full face respirator is requested, the individual and/or their supervisor must first contact Environmental Health & Safety for a consultation to determine if respirator use is necessary. If EH&S determines the use of a respirator is necessary, the individual must participate in the University's respirator program. This includes a medical evaluation; respirator fit test, and training.

EMERGENCY PROCEDURES

In case of fire or large and/or extremely hazardous chemical releases pull the fire alarm and evacuate the area

If someone is seriously injured or unconscious

CALL 911 or CAMPUS POLICE AT <enter your campus PD #>

From a safe place, provide as much information as possible to the emergency responders including chemical name, volume, hazards, injuries, and location.

Chemical Exposure: Remove any contaminated clothing, and IMMEDIATELY flush contaminated skin with water for at least 15 minutes following any skin contact. For eye exposures, IMMEDIATELY flush eyes with water for at least 15 minutes. Consult SDS for guidance on appropriate first aid. Where medical attention is required, bring the SDS(s) of chemical(s) to aid medical staff in proper diagnosis and treatment.

Evacuation Procedure

- Immediately evacuate the building via the nearest exit when the fire alarm is activated.
- If unable to evacuate due to a disability, shelter in the area of rescue / refuge, typically a stairwell landing, and wait for assistance from drill volunteers or emergency responders.
- Instruct visitors and students to evacuate and assist them in locating the nearest exit.
- Do not use elevators to exit the building during an evacuation as they may become inoperable.
- Carry only those personal belongings that are within the immediate vicinity.
- Close doors to limit the potential spread of smoke and fire.
- Terminate all hazardous operations and power off equipment.
- Close all hazardous materials containers.
- Remain outside of the building until the building is released for reentry.
- Do not restrict or impede the evacuation.
- Convene in the designated grassy gathering area and await instruction from emergency responders or drill volunteers. Avoid parking lots.
- Report fire alarm deficiencies, (e.g., trouble hearing the alarm) to facilities personnel for repair.
- Notify evacuation drill volunteers or emergency responders of persons sheltering in the areas of rescue/ refuge.
- **Never assume that an alarm is a "false alarm". Treat all fire alarm activations as emergencies. Get out of the building!**

Incident and Near Miss Reporting: Report any incident that occurs in any University of South Florida affiliated teaching or research laboratory/studio or field research project. An incident means any unplanned event within the scope of a procedure that causes, or has the potential to cause, an injury or illness and/or damage to equipment, buildings, or the natural environment. Due to medical privacy concerns, no personal identifying information of the person involved in the incident shall be entered or submitted with the form.

http://www.usf.edu/administrative-services/environmental-health-safety/reporting/index.aspx

Workers' Compensation Procedure: Call AmeriSys at 800-455-2079 to report a work-related injury or illness. Complete the Supervisor's Accident Investigation Report available at the link above and send it to EH&S within 24 hours.

WASTE DISPOSAL

Describe how to dispose of the chemical waste produced from this activity.

All chemical waste generated within USF laboratories is considered hazardous waste and must be disposed of as hazardous waste in accordance with the USF Hazardous Waste Management Procedure, the U.S. EPA, and the FDEP. The USF Hazardous Waste Management Procedure can be found using the following link, https://www.usf.edu/administrative-services/environmental-health-safety/documents/hazwaste-managementprocedure.pdf

TRAINING REQUIREMENTS

All individuals working with chemicals in USF laboratories must take EH&S's Laboratory & Research Safety Training. To register for Laboratory & Research Training, please use the following link, https://www.usf.edu/administrative-services/environmental-health-safety/training/course-descriptions.aspx#labsafety

This procedure may warrant additional safety training per the PI, EH&S, or an authorizing unit such as the Biosafety or Radiation Safety programs. Check training requirements for this activity below:

☐ Research Specific Training from the PI/Lab Supervisor or their designee

☐ EH&S Laboratory & Research Safety Training

☐ EH&S Safety and Compliance in the Arts

☐ EH&S Respirator Fit Test

☐ EH&S Biomedical Waste

☐ EH&S Universal Pharmaceutical Waste Testing

☐ EH&S Fire Prevention Safety

☐ EH&S Slips, Trips, and Falls

☐ RIC Biosafety Core Course

☐RIC Shipping Biohazardous Materials ☐RIC BSL 3 ☐RIC Radiation Safety ☐RIC Laser Safety ☐RIC Boating Safety ☐RIC Scientific Diving ☐Other:_____
PRIOR APPROVALS
☐ This activity requires prior approval from the PI/designee. ☐ If this box is checked, working alone is not allowed.

By signing and dating here the Principal Investigator or a designee certifies that the Standard Operating Procedure (SOP) for ***<enter SOP topic>*** is accurate and effectively provides safe standard operating procedures for employees and students in this lab who will handle this hazardous chemical.

_____

Signature Printed Name Date

I affirm that I have read and understand the Standard Operating Procedure for ***<enter SOP topic>*** and have undergone the EH&S Laboratory & Research training and any lab specific training regarding this SOP.

Printed Name	Signature	Date

Appendix B: Hazardous Waste Management Procedures

B-1 Introduction & Responsibilities

Hazardous waste is generated at the University of South Florida (USF) from various activities including research, teaching, art, and facilities support. The Environmental Protection Agency (EPA) is the Federal agency charged with developing and ensuring compliance with hazardous waste regulations. In the State of Florida, the Florida Department of Environmental Protection (DEP) has been delegated the authority to develop additional hazardous waste regulations, providing they are at least as stringent as those promulgated by the EPA, and inspect facilities that generate, store, or dispose of hazardous waste. Therefore, USF is required to adhere to the regulations of both the EPA and DEP and may be subject to unannounced inspections by either agency.

EPA and DEP regulations allow for small quantities of hazardous waste to be accumulated under the control of the generator at or near the point of waste generation up to a maximum of 55 gallons, or one quart of EPA acutely hazardous waste. These accumulation points are called satellite accumulation areas (SAAs). The University may classify each laboratory, shop, studio, or other appropriate area as an SAA.

This document outlines the regulations governing the accumulation of hazardous waste in SAAs and describes the procedures for managing hazardous waste in SAAs at USF.

ENVIRONMENTAL HEALTH AND SAFETY

Environmental Health and Safety (EH&S) provides information to University personnel on proper storage and disposal methods for hazardous waste. EH&S ensures that the storage of chemicals at the University's central Hazardous Waste Accumulation Site and final shipment and disposal of waste are in compliance with applicable federal, state, and local regulations. In addition, EH&S completes and submits all applicable hazardous waste reports to the appropriate regulatory agencies.

FACULTY, STAFF ANDSTUDENTS

All faculty, staff, and students working with hazardous materials that result in the generation of hazardous waste must comply with hazardous waste regulations and this procedure.

- Each satellite accumulation area should appoint an individual responsible for ensuring that its respective area complies with the University's procedures including the procedures contained within this document. This individual may be a Principal Investigator, lab manager, graduate student, shop supervisor, or other designated staff member.
- The ultimate responsibility for hazardous waste satellite accumulation area compliance lies with the Principal Investigator or worksite supervisor. Any fines incurred for violations of the hazardous waste regulations during inspections by regulatory agencies will be the responsibility of the department.

B- 2 Procedures

HAZARDOUS WASTEIDENTIFICATION

A *waste* is defined as a material that has no intended use or reuse and includes chemicals that are no longer needed, expired, or spilled.

There are two types of wastes that the Environmental Protection Agency (EPA) considers hazardous *wastes:*

Listed wastes:

- Waste chemicals specifically listed by the EPA in40 CFR 261.31, 40 CFR 261.32, and 40 CFR 261.33. See EPA Toxicity Characteristic and Listed Hazardous Wastes.

Characteristic wastes are wastes that exhibit one or more of the following characteristics:

- *Ignitability*- substances that create fires under certain conditions or spontaneously combust and have a flashpoint less than 60°C(140°F) **RCRA Code = D001**
- *Corrosivity*- acids with pH less than 2 or bases with pH greater than12.5 **RCRA Code = D002**
- *Reactivity*- substances that are unstable under normal conditions and are capable of causing explosions or emitting toxic fumes, gases, or vapors when mixed with water or other materials **RCRA Code = D003**
- *Toxicity*- substances that are harmful or fatal when ingested or absorbed or are capable of polluting groundwater if disposed of on land **RCRA Code = D004 – D043**

Note: These characteristics are further defined in 40 CFR 261.21 - 261.24.

Not all chemical wastes are hazardous wastes as defined by the EPA. However, all chemical wastes should be stored in satellite accumulation areas and should be treated as hazardous wastes due to local disposal restrictions. Even chemical wastes that are not EPA hazardous wastes should be disposed of through EH&S unless specific authority has been granted through EH&S for alternative disposal methods. The EH&S staff is responsible for the final determination of whether a waste is hazardous as well as the ultimate disposal of all chemical waste.

Radioactive waste and biomedical waste have separate management requirements from chemical hazardous waste; therefore, they are covered under separate programs at USF. Please consult the EH&S website (http://www.usf.edu/ehs) for more information about disposal of biomedical waste, or the Research Integrity and Compliance website (https://www.usf.edu/research-innovation/research-integrity-compliance/) for more information about radioactive waste.

Mixtures of radioactive or biomedical wastes with chemical wastes should be minimized due to the difficulty of disposing of these wastes and costs associated with disposal. Please contact the EH&S Office with questions regarding mixed waste.

WASTE STORAGELOCATIONS

According to EPA regulations all chemical waste must be labeled and stored in a satellite accumulation area in the immediate vicinity of the related work process and must be under the control of those generating the waste. Each SAA should be identified with a sign or sticker for this purpose. SAA stickers are available through the EH&S Office. Chemical wastes may not be moved to an SAA in a different room or work area for storage.

CHEMICAL COMPATIBILITY

Chemical wastes within the satellite accumulation area should be segregated by waste type to minimize the potential for dangerous reactions and to help reduce the costs for final disposal.

Safety should be the highest priority when accumulating hazardous waste. Some safety practices that should be considered when accumulating and storing chemical waste are:

- Read the SDS for potential reactivity information paying special attention to any compatibility information prior to combining any waste chemicals into a common waste container.
- Submit unused chemicals for disposal in their original containers to minimize exposure to harmful vapors or dusts.
- Solid wastes should be kept separate from liquidwastes.
- Wastes should be divided into separate waste streams according to their hazard characteristics. In many cases, wastes with similar hazard characteristics may be combined. Some examples include:
  - Non-halogenated flammable liquids (e.g. xylene, methanol, gasoline)
  - Halogenated flammable liquids (e.g. chloroform, dichloromethane)
  - Mercury (e.g. elemental and compounds)
  - Other Heavy metals (e.g. lead, arsenic, chromium)
  - Used oil (e.g. used pump oil)
  - Used photographic waste (fixer separated from developer)
  - Toxic organic and inorganic liquids (e.g. ethidium bromide)
  - Toxic organic and inorganic solids (e.g. acrylamide)

Please be aware that some chemicals that have similar hazard characteristics are incompatible with one another, such as nitric acid and glacial acetic acid. In general, corrosives, oxidizers, or other reactive liquids should not be combined with any other waste streams due to their potential to generate gases or heat. Consult the SDS for compatibility information before combining any chemicals.

CONTAINERMANAGEMENT

Containers used to accumulate hazards waste must be:

- Compatible with the waste chemicals contained therein.
- Tightly sealed except when wastes are being actively poured into them. Funnels must be removed immediately after use. The evaporation of hazardous waste is a violation of hazardous waste regulations.
- Able to withstand packaging and travel. Test tubes, beakers, flasks, plastic milk/soda bottles or any other type of beverage/food containers are not an acceptable means of packaging hazardous wastes.
- Labeled with the words "Hazardous Waste", include the contents of the container with percentages of

chemical mixtures, and a description of the hazard (Toxic, Ignitable, Corrosive, Reactive). Attaching a completed Chemical/Hazardous Waste Tag to the container will satisfy these requirements.

- The use of secondary containment in each SAA is strongly recommended. The secondary containment should be large enough to collect the volume of the largest waste container stored in that SAA if the container leaks. Polyethylene trays are commonly used as secondary containment for laboratory wastes.

Chemical/Hazardous Waste Tags, stickers, and various hazardous waste accumulation containers are available from Environmental Health & Safety. For information about acceptable waste containers and/or labeling requirements contact the EH&S hazardous waste staff.

MANAGEMENT OF EMPTY CONTAINERS

Containers from which all chemical product has been removed are considered empty and can be safely disposed of in the laboratory trash if:

- All waste has been removed that can be removed using the practices commonly employed to remove materials from that type of container(e.g. pouring, pumping), *and*
- No more than one inch of residue remains on the bottom of the container *or*
- No more than 3% by weight of the total capacity of the container remains in the container if the container is less than 110 gallons, *or*
- No more than 0.3% by weight of the total capacity of the container remains in the container if the container is greater than 110 gallons.
- The pressure in compressed gas cylinders is equal to atmospheric pressure.
- Original chemical labels are defaced and marked with the word "Empty".

Please note that containers that contained EPA acutely hazardous waste must be managed as hazardous waste *even if empty*.

WASTE PICKUPS

Hazardous waste pickup procedures vary based upon campus location. If you are unsure of the hazardous waste collection procedures for your location, please contact EH&S at (813) 974-4036.

CHEMICALSPILLS

CHEMICAL SPILL KITS

Each satellite accumulation area should be prepared to safely cleanup any small spills that could occur during everyday activities.

A chemical spill kit should be stored near each satellite accumulation area for use in the event of a spill. Each satellite accumulation area has different chemical spill kit needs depending on the type and quantity of hazardous

materials used. In order to determine specific spill kit components, consult the safety data sheets of the chemicals used in the area. A basic spill kit should contain:

- A five-gallon plastic bucket
- Personal protective equipment to be used only for spill cleanup (e.g., thick rubber gloves, splash goggles, shoe covers.)
- Inert absorbents compatible with chemicals to be absorbed(e.g., vermiculite, clay, absorbent socks or pillows)
- Plastic dustpan and brush
- Chemical-resistant bags
- Hazardous waste tags or labels

The five-gallon bucket can be labeled with the words "Chemical Spill Kit" and all other materials can be stored within it for quick access in the event of a spill.

SPILL CLEANUPPROCEDURES

If a spilled chemical poses an immediate threat to life or health, the building occupants should be evacuated from the building and emergency responders should be contacted immediately. Occupants can be notified of a building evacuation through the activation of a fire alarm pull station. Dial 911 to contact the local emergency responders for your area. Detailed information should be provided to the emergency responders including chemical name, volume, hazards, spill location, and any injuries incurred.

Prior to beginning any spill cleanup, area workers should be notified of the spill and bystanders should be asked to leave the immediate area. The contaminated area should be cordoned off as necessary.

Please note that the SDS should be consulted and the proper PPE should be worn prior to cleaning up any spilled materials.

To clean up a minor liquid spill:

- Spread absorbent liberally around and over the surface of the liquidand allow time to absorb;
- Use a dustpan and brush to collect the wet absorbent and transfer to a five gallon plastic bucket;
- Store contaminated brushes, dustpans, and protective equipment in a chemical resistant bag;
- Use Chemical/Hazardous Waste Tags to identify the contents of any containers used for spill cleanup;
- Dispose of all cleanup materials as hazardouswaste.

Under certain conditions, EH&S should be contacted to assist with a spill cleanup. EH&S should be contacted if:

- The chemical volume is large
- The chemical involved is acutely hazardous
- There is not adequate ventilation in the spill area to protect workers

- The laboratory does not have appropriate spill cleanup materials or PPE
- Personnel in the laboratory do not feel that they can safely handle the cleanup

The University Police Department (UPD) should be contacted if a spill that requires EH&S assistance occurs outside of normal business hours. The UPD will contact EH&S representatives who can assist with the cleanup.

EH&S or UPD may contact the Fire Department or a hazardous materials contractor to assist with decontamination if a spill is particularly large or hazardous.

Every effort should be made to prevent spilled materials from entering drains, soil, or bodies of water. If a spilled chemical or fuel enters the drain, soil, or a water body, EH&S must be contacted immediately.

WASTEMINIMIZATION

All USF laboratories and work areas are encouraged to minimize the amount of hazardous waste they create. Waste minimization can be accomplished by using several methods:

A. Substituting or using less-hazardousmaterials
   - Whenever possible, choose materials or procedures that use less- hazardous materials over those that involve the creation of hazardous wastes.
   - Avoid the use of heavy metals such as arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.
   - Use non-hazardous cleaners in lieu of solvent or acid-based cleaning solutions.
   - Replace mercury thermometers with alcohol or digital thermometers.

B. Using smaller amounts of chemicals in experiments
   - Practice micro-scale chemistry or use demonstrations instead of individual experiments in teaching laboratories.
   - Purchase pre-mixed solutions or kits whenever available.

C. Practice effective inventory control
   - Keep an up-to-date inventory to prevent the purchase of duplicate chemicals.
   - Purchase chemicals in the smallest quantity necessary to complete the task.
   - Label all containers with the date received and use a “first in, first out” approach.
   - Label all chemicals transferred from original containers with the complete chemical name, date of transfer, and the preparer’s name.
   - Avoid the generation of unknown wastes by performing periodic inventory evaluations and replacing labels that have degraded.
   - Purchase compressed gas cylinders from manufacturers to whom cylinders can be returned when empty.

If you have any questions regarding these procedures, contact Environmental Health and Safety at (813) 974-4036 for clarification.

EPA Toxicity Characteristic and Listed Hazardous Wastes

RCRA Toxicity Characteristic Wastes (D004-D043)

RCRA Code	Chemical Name	CAS #	Regulatory Limit (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D006	Cadmium	71-43-2	1.0
D007	Chromium	7440-43-9	5.0
D008	Lead	56-23-5	5.0
D009	Mercury	57-74-9	0.2
D010	Selenium	108-90-7	1.0
D011	Silver	67-66-3	5.0
D012	Endrin	7440-47-3	0.02
D013	Lindane	95-48-7	0.4
D014	Methoxychlor	108-39-4	10.0
D015	Toxaphene	106-44-5	0.5
D016	2,4-D		10.0
D017	2,4,5-TP (Silvex)	94-75-7	1.0
D018	Benzene	106-46-7	0.5
D019	Carbon tetrachloride	107-06-2	0.5
D020	Chlordane	75-35-4	0.03
D021	Chlorobenzene	121-14-2	100.0
D022	Chloroform	72-20-8	6.0
D023	o-Cresol	76-44-8	200[1]
D024	m-Cresol	118-74-1	200[1]
D025	p-Cresol	87-68-3	200[1]
D026	Cresol	67-72-1	200[1]
D027	1,4-Dichlorobenzene	7439-92-1	7.5
D028	1,2-Dichloroethane	58-89-9	0.5
D029	1,1-Dichloroethylene	7439-97-6	0.7
D030	2,4-Dinitrotoluene	72-43-5	0.13[2]
D031	Heptachlor (and epoxide)	78-93-3	0.008
D032	Hexachlorobenzene	98-95-3	0.13[2]
D033	Hexachlorobutadiene	87-86-5	0.5
D034	Hexachloroethane	110-86-1	3.0
D035	Methyl ethyl ketone	7782-49-2	200.0
D036	Nitrobenzene	7440-22-4	2.0
D037	Pentachlorophenol	127-18-4	100.0
D038	Pyridine	8001-35-2	5.0[1]
D039	Tetrachloroethylene	79-01-6	0.7
D040	Trichloroethylene	95-95-4	0.5
D041	2,4,5-Trichlorophenol	88-06-2	400.0

RCRA Code	Chemical Name	CAS #	Regulatory Limit (mg/L)
D042	2,4,6-Trichlorophenol	93-72-1	2.0
D043	Vinyl chloride	75-01-4	0.2

[1]Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.

[2]If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/l.

RCRA Hazardous Wastes from Non-specific Sources (i.e. F-listed, and common to Higher Education)

RCRA Code	Hazardous Waste
F002	The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures
F003	The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol.)

RCRA Code	Hazardous Waste
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5-trichlorophenol.)
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in §261.31 or §261.32.)
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing Hexachlorophene sythesized from prepurified 2,4,5-trichlorophenol as the sole component.)

RCRA Acutely Hazardous Wastes (i.e. P-listed)

RCRA Code	Chemical Name	CAS #
P001	Warfarin	81-81-2
P001	Warfarin, & salts, conc.>0.3%	81-81-2
P002	1-Acetyl-2-thiourea	591-08-2
P003	Acrolein	107-02-8

RCRA Code	Chemical Name	CAS #
P003	2-Propenal	107-02-8
P004	Aldrin	309-00-2
P004	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1.alpha.,4.alpha.,4a.beta.,5.alpha.,8.alpha.,8a.beta.)-	309-00-2
P005	Allyl alcohol	107-18-6
P005	2-Propen-1-ol	107-18-6
P006	Aluminum phosphide	20859-73-8
P007	5-(Aminomethyl)-3-isoxazolol	2763-96-4
P007	Muscimol	2763-96-4
P008	4-Aminopyridine	504-24-5
P008	Pyridine, 4-amino-	504-24-5
P009	Ammonium picrate	131-74-8
P010	Arsenic acid	7778-39-4
P011	Arsenic pentoxide	1303-28-2
P012	Arsenic trioxide	1327-53-3
P012	Arsenous oxide	1327-53-3
P013	Barium cyanide	542-62-1
P014	Benzenethiol	108-98-5
P014	Thiophenol	108-98-5
P015	Beryllium	7440-41-7
P016	Bis(chloromethyl) ether	542-88-1
P016	Chloromethyl ether	542-88-1
P016	Dichloromethyl ether	542-88-1
P016	Methane, oxybis[chloro-	542-88-1
P017	Bromoacetone	598-31-2
P018	Brucine	357-57-3
P020	Dinitrobutyl phenol	88-85-7
P020	Dinoseb	88-85-7
P021	Calcium cyanide	592-01-8
P022	Carbon disulfide	75-15-0
P023	Chloroacetaldehyde	107-20-0
P024	p-Chloroaniline	106-47-8
P026	Thiourea, (2-chlorophenyl)-	5344-82-1
P027	3-Chloropropionitrile	542-76-7
P027	Propionitrile, 3-chloro-	542-76-7
P028	Benzyl chloride	100-44-7
P029	Copper cyanide	544-92-3
P030	Cyanides (soluble salts and complexes), not otherwise specified	N.A.
P031	Cyanogen	460-19-5
P031	Ethanedinitrile	460-19-5
P033	Cyanogen chloride	506-77-4
P034	2-Cyclohexyl-4,6-dinitrophenol	131-89-5

RCRA Code	Chemical Name	CAS #
P036	Dichlorophenylarsine	696-28-6
P036	Phenyl dichloroarsine	696-28-6
P037	Dieldrin	60-57-1
P038	Diethylarsine	692-42-2
P039	Disulfoton	298-04-4
P040	O,O-Diethyl O-pyrazinyl phosphorothioate	297-97-2
P040	Thionazin	297-97-2
P041	Diethyl-p-nitrophenyl phosphate	311-45-5
P042	Epinephrine	51-43-4
P043	Diisopropylfluorophosphate	55-91-4
P043	Isofluorphate	55-91-4
P044	Dimethoate	60-51-5
P045	Thiofanox	39196-18-4
P046	Benzeneethanamine, alpha,alpha-dimethyl-	122-09-8
P047	4,6-Dinitro-o-cresol	534-52-1
P047	Dinitrocresol	534-52-1
P047	4,6-Dinitro-o-cresol and salts	534-52-1
P048	2,4-Dinitrophenol	51-28-5
P049	Dithiobiuret	541-53-7
P049	2,4-Dithiobiuret	541-53-7
P050	Endosulfan	115-29-7
P051	Endrin	72-20-8
P054	Aziridine	151-56-4
P054	Ethyleneimine	151-56-4
P056	Fluorine	7782-41-4
P057	Fluoroacetamide	640-19-7
P058	Fluoroacetic acid, sodium salt	62-74-8
P058	Sodium fluoroacetate	62-74-8
P059	Heptachlor	76-44-8
P059	1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene	76-44-8
P060	Isodrin	465-73-6
P062	Hexaethyl tetraphosphate	757-58-4
P063	Hydrocyanic acid	74-90-8
P063	Hydrogen cyanide	74-90-8
P064	Methane, isocyanato-	624-83-9
P064	Methyl isocyanate	624-83-9
P065	Mercury fulminate	628-86-4
P066	Ethanimidothioic acid, N-[[methylamino)carbonyl]	16752-77-5
P066	Methomyl	16752-77-5
P067	Aziridine, 2-methyl	75-55-8
P067	Propyleneimine	75-55-8

RCRA Code	Chemical Name	CAS #
P068	Hydrazine, methyl-	60-34-4
P068	Methyl hydrazine	60-34-4
P069	Acetone cyanohydrin	75-86-5
P069	2-Methyllactonitrile	75-86-5
P070	Aldicarb	116-06-3
P071	Methyl parathion	298-00-0
P071	Parathion-methyl	298-00-0
P072	ANTU	86-88-4
P072	Thiourea, 1-naphthalenyl-	86-88-4
P073	Nickel carbonyl	13463-39-3
P074	Nickel cyanide	557-19-7
P075	Nicotine	54-11-5
P075	Nicotine and salts	54-11-5
P075	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-,(S)-	54-11-5
P076	Nitric oxide	10102-43-9
P076	Nitrogen oxide (NO)	10102-43-9
P077	p-Nitroaniline	100-01-6
P078	Nitrogen dioxide	10102-44-0
P081	Nitroglycerin	55-63-0
P082	Methanamine, N-methyl-N-nitroso-	62-75-9
P082	N-Nitrosodimethylamine	62-75-9
P082	Nitrosodimethylamine	62-75-9
P084	N-Nitrosomethylvinylamine	4549-40-0
P085	Diphosphoramide, octamethyl-	152-16-9
P087	Osmium oxide OsO4 (T-4)-	20816-12-0
P087	Osmium tetroxide	20816-12-0
P088	Endothall	145-73-3
P089	Parathion	56-38-2
P089	Phosphorothioic acid, O,O-diethyl-O-(4-nitrophenyl) ester	56-38-2
P092	Phenylmercuric acetate	62-38-4
P092	Phenylmercury acetate	62-38-4
P093	Phenylthiourea	103-85-5
P094	Phorate	298-02-2
P095	Carbonic dichloride	75-44-5
P095	Phosgene	75-44-5
P096	Phosphine	7803-51-2
P097	Famphur	52-85-7
P098	Potassium cyanide	151-50-8
P099	Potassium silver cyanide	506-61-6
P101	Ethyl cyanide	107-12-0
P101	Propanenitrile	107-12-0

RCRA Code	Chemical Name	CAS #
P101	Propionitrile	107-12-0
P102	Propargyl alcohol	107-19-7
P103	Selenourea	630-10-4
P104	Silver cyanide	506-64-9
P105	Sodium azide (Na(N3))	26628-22-8
P106	Sodium cyanide (Na(CN))	143-33-9
P108	Strychnine	57-24-9
P108	Strychnine, and salts	57-24-9
P109	Sulfotep	3689-24-5
P109	Tetraethyldithiopyrophosphate	3689-24-5
P110	Tetraethyl lead	78-00-2
P111	TEPP	107-49-3
P111	Tetraethyl pyrophosphate	107-49-3
P112	Methane, tetranitro-	509-14-8
P112	Tetranitromethane	509-14-8
P113	Thallic oxide	1314-32-5
P114	Selenious acid, dithallium(1+) salt	12039-52-0
P115	Thallium(I) sulfate	7446-18-6
P115	Thallous sulfate	7446-18-6
P116	Thiosemicarbazide	79-19-6
P119	Ammonium vanadate	7803-55-6
P120	Vanadium pentoxide	1314-62-1
P121	Zinc cyanide	557-21-1
P122	Zinc phosphide	1314-84-7
P122	Zinc phosphide (conc. > 10%)	1314-84-7
P123	Camphechlor	8001-35-2
P123	Camphene, octachloro-	8001-35-2
P123	Toxaphene	8001-35-2
P127	Carbofuran	1563-66-2
P128	Mexacarbate	315-18-4
P185	Carbamic acid, methyl-, O-(((2,4-dimethyl-1,3-dithiolan-2-yl)methylene)amino)-	26419-73-8
P188	Physostigmine, salicylate (1:1)	57-64-7
P189	Carbosulfan	55285-14-8
P190	Metolcarb	1129-41-5
P191	Dimetilan	644-64-4
P192	Isopropylmethylpyrazolyl dimethylcarbamate	119-38-0
P194	Oxamyl	23135-22-0
P196	Manganese, bis(dimethylcarbamodithioato-S,S')-	15339-36-3
P197	Formparanate	17702-57-7
P198	Formetanate hydrochloride	23422-53-9
P199	Mercaptodimethur	2032-65-7

RCRA Code	Chemical Name	CAS #
P199	Methiocarb	2032-65-7
P201	Promecarb	2631-37-0
P202	Phenol, 3-(1-methylethyl)-, methylcarbamate	64-00-6
P203	Aldicarb sulfone	1646-88-4
P204	Physostigmine	57-47-6
P205	Ziram	137-30-4

RCRA Toxic Wastes (U-Listed)

RCRA Code	Chemical Name	CAS #
U001	Acetaldehyde	75-07-0
U002	Acetone	67-64-1
U003	Acetonitrile	75-05-8
U004	Acetophenone	98-86-2
U005	2-Acetylaminofluorene	53-96-3
U006	Acetyl chloride	75-36-5
U007	Acrylamide	79-06-1
U008	Acrylic acid	79-10-7
U009	Acrylonitrile	107-13-1
U009	2-Propenenitrile	107-13-1
U010	Mitomycin C	50-07-7
U011	Amitrole	61-82-5
U012	Aniline	62-53-3
U014	Auramine	492-80-8
U014	C.I. Solvent Yellow 34	492-80-8
U015	Azaserine	115-02-6
U016	Benz[c]acridine	225-51-4
U017	Benzal chloride	98-87-3
U018	Benz[a]anthracene	56-55-3
U019	Benzene	71-43-2
U020	Benzenesulfonyl chloride	98-09-9
U021	Benzidine	92-87-5
U022	Benzo[a]pyrene	50-32-8
U023	Benzoic trichloride	98-07-7
U023	Benzotrichloride	98-07-7
U024	Bis(2-chloroethoxy) methane	111-91-1
U025	Bis(2-chloroethyl) ether	111-44-4
U025	Dichloroethyl ether	111-44-4
U026	Chlornaphazine	494-03-1
U027	Bis(2-chloro-1-methylethyl)ether	108-60-1
U027	Dichloroisopropyl ether	108-60-1

RCRA Code	Chemical Name	CAS #
U028	Bis(2-ethylhexyl)phthalate	117-81-7
U028	DEHP	117-81-7
U028	Di(2-ethylhexyl) phthalate	117-81-7
U029	Bromomethane	74-83-9
U029	Methyl bromide	74-83-9
U030	4-Bromophenyl phenyl ether	101-55-3
U031	n-Butyl alcohol	71-36-3
U032	Calcium chromate	13765-19-0
U033	Carbonic difluoride	353-50-4
U034	Acetaldehyde, trichloro-	75-87-6
U035	Chlorambucil	305-03-3
U036	Chlordane	57-74-9
U036	4,7-Methanoindan, 1,2,3,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	57-74-9
U037	Chlorobenzene	108-90-7
U038	Benzeneacetic acid, 4-chloro-.alpha.-(4-chlorophenyl)-.alpha.-hydroxy-, ethyl ester	510-15-6
U038	Chlorobenzilate	510-15-6
U039	p-Chloro-m-cresol	59-50-7
U041	Epichlorohydrin	106-89-8
U041	Oxirane, (chloromethyl)-	106-89-8
U042	2-Chloroethyl vinyl ether	110-75-8
U043	Ethene, chloro-	75-01-4
U043	Vinyl chloride	75-01-4
U044	Chloroform	67-66-3
U044	Methane, trichloro-	67-66-3
U045	Chloromethane	74-87-3
U045	Methane, chloro-	74-87-3
U045	Methyl chloride	74-87-3
U046	Chloromethyl methyl ether	107-30-2
U046	Methane, chloromethoxy-	107-30-2
U047	2-Chloronaphthalene	91-58-7
U048	2-Chlorophenol	95-57-8
U049	4-Chloro-o-toluidine, hydrochloride	3165-93-3
U050	Benzo(a)phenanthrene	218-01-9
U050	Chrysene	218-01-9
U051	Creosote	N.A.
U052	m-Cresol	108-39-4
U052	o-Cresol	95-48-7
U052	p-Cresol	106-44-5
U052	Cresol (mixed isomers)	1319-77-3
U053	2-Butenal	4170-30-3
U053	2-Butenal, (e)-	123-73-9

RCRA Code	Chemical Name	CAS #
U053	Crotonaldehyde	4170-30-3
U053	Crotonaldehyde, (E)-	123-73-9
U055	Cumene	98-82-8
U056	Cyclohexane	110-82-7
U057	Cyclohexanone	108-94-1
U058	Cyclophosphamide	50-18-0
U059	Daunomycin	20830-81-3
U060	DDD	72-54-8
U061	DDT	50-29-3
U062	Carbamothioic acid, bis(1-methylethyl)-S-(2,3-dichloro-2-propenyl)ester	2303-16-4
U062	Diallate	2303-16-4
U063	Dibenz[a,h]anthracene	53-70-3
U064	Benzo(rst)pentaphene	189-55-9
U064	Dibenz[a,i]pyrene	189-55-9
U066	DBCP	96-12-8
U066	1,2-Dibromo-3-chloropropane	96-12-8
U067	1,2-Dibromoethane	106-93-4
U067	Ethylene dibromide	106-93-4
U068	Methylene bromide	74-95-3
U069	n-Butyl phthalate	84-74-2
U069	Dibutyl phthalate	84-74-2
U070	o-Dichlorobenzene	95-50-1
U070	1,2-Dichlorobenzene	95-50-1
U071	1,3-Dichlorobenzene	541-73-1
U072	1,4-Dichlorobenzene	106-46-7
U073	3,3'-Dichlorobenzidine	91-94-1
U074	2-Butene, 1,4-dichloro-	764-41-0
U074	1,4-Dichloro-2-butene	764-41-0
U075	CFC-12	75-71-8
U075	Dichlorodifluoromethane	75-71-8
U076	1,1-Dichloroethane	75-34-3
U076	Ethylidene Dichloride	75-34-3
U077	1,2-Dichloroethane	107-06-2
U077	Ethylene dichloride	107-06-2
U078	1,1-Dichloroethylene	75-35-4
U078	Ethene, 1,1-dichloro-	75-35-4
U078	Vinylidene chloride	75-35-4
U079	1,2-Dichloroethylene	156-60-5
U080	Dichloromethane	75-09-2
U080	Methylene chloride	75-09-2
U081	2,4-Dichlorophenol	120-83-2

RCRA Code	Chemical Name	CAS #
U082	2,6-Dichlorophenol	87-65-0
U083	1,2-Dichloropropane	78-87-5
U083	Propane 1,2-dichloro-	78-87-5
U084	1,3-Dichloropropene	542-75-6
U084	1,3-Dichloropropylene	542-75-6
U085	2,2'-Bioxirane	1464-53-5
U085	Diepoxybutane	1464-53-5
U086	Hydrazine, 1,2-diethyl-	1615-80-1
U087	O,O-Diethyl S-methyl dithiophosphate	3288-58-2
U088	Diethyl phthalate	84-66-2
U089	Diethylstilbestrol	56-53-1
U090	Dihydrosafrole	94-58-6
U091	3,3'-Dimethoxybenzidine	119-90-4
U092	Dimethylamine	124-40-3
U092	Methanamine, N-methyl-	124-40-3
U093	4-Dimethylaminoazobenzene	60-11-7
U093	Dimethylaminoazobenzene	60-11-7
U094	7,12-Dimethylbenz[a]anthracene	57-97-6
U095	3,3'-Dimethylbenzidine	119-93-7
U095	o-Tolidine	119-93-7
U096	Cumene hydroperoxide	80-15-9
U096	Hydroperoxide, 1-methyl-1-phenylethyl-	80-15-9
U097	Dimethylcarbamyl chloride	79-44-7
U098	1,1-Dimethyl hydrazine	57-14-7
U098	Dimethylhydrazine	57-14-7
U098	Hydrazine, 1,1-dimethyl-	57-14-7
U099	Hydrazine, 1,2-dimethyl-	540-73-8
U101	2,4-Dimethylphenol	105-67-9
U102	Dimethyl phthalate	131-11-3
U103	Dimethyl sulfate	77-78-1
U105	2,4-Dinitrotoluene	121-14-2
U106	2,6-Dinitrotoluene	606-20-2
U107	Di-n-octyl phthalate	117-84-0
U107	n-Dioctylphthalate	117-84-0
U108	1,4-Dioxane	123-91-1
U109	1,2-Diphenylhydrazine	122-66-7
U109	Hydrazine, 1,2-diphenyl-	122-66-7
U109	Hydrazobenzene	122-66-7
U110	Dipropylamine	142-84-7
U111	Di-n-propylnitrosamine	621-64-7
U111	N-Nitrosodi-n-propylamine	621-64-7

RCRA Code	Chemical Name	CAS #
U112	Ethyl acetate	141-78-6
U113	Ethyl acrylate	140-88-5
U114	Ethylenebisdithiocarbamic acid, salts & esters	111-54-6
U115	Ethylene oxide	75-21-8
U115	Oxirane	75-21-8
U116	Ethylene thiourea	96-45-7
U117	Ethane, 1,1'-oxybis-	60-29-7
U117	Ethyl ether	60-29-7
U118	Ethyl methacrylate	97-63-2
U119	Ethyl methanesulfonate	62-50-0
U120	Fluoranthene	206-44-0
U121	CFC-11	75-69-4
U121	Trichlorofluoromethane	75-69-4
U121	Trichloromonofluoromethane	75-69-4
U122	Formaldehyde	50-00-0
U122	Formaldehyde (solution)	50-00-0
U123	Formic acid	64-18-6
U124	Furan	110-00-9
U125	Furfural	98-01-1
U126	Glycidylaldehyde	765-34-4
U127	Hexachlorobenzene	118-74-1
U128	Hexachloro-1,3-butadiene	87-68-3
U128	Hexachlorobutadiene	87-68-3
U129	Cyclohexane, 1,2,3,4,5,6-hexachloro-,(1.alpha.,2.alpha.,3.beta.,4.alpha.,5.alpha.,6.beta.)-	58-89-9
U129	Hexachlorocyclohexane (gamma isomer)	58-89-9
U129	Lindane	58-89-9
U130	Hexachlorocyclopentadiene	77-47-4
U131	Hexachloroethane	67-72-1
U132	Hexachlorophene	70-30-4
U133	Hydrazine	302-01-2
U134	Hydrofluoric acid	7664-39-3
U134	Hydrofluoric acid (conc. 50% or greater)	7664-39-3
U134	Hydrogen fluoride	7664-39-3
U134	Hydrogen fluoride (anhydrous)	7664-39-3
U135	Hydrogen sulfide	7783-06-4
U136	Cacodylic acid	75-60-5
U137	Indeno(1,2,3-cd)pyrene	193-39-5
U138	Methyl iodide	74-88-4
U140	Isobutyl alcohol	78-83-1
U141	Isosafrole	120-58-1
U142	Kepone	143-50-0

RCRA Code	Chemical Name	CAS #
U143	Lasiocarpine	303-34-4
U144	Lead acetate	301-04-2
U145	Lead phosphate	7446-27-7
U146	Lead subacetate	1335-32-6
U147	Maleic anhydride	108-31-6
U148	Maleic hydrazide	123-33-1
U149	Malononitrile	109-77-3
U150	Melphalan	148-82-3
U151	Mercury	7439-97-6
U152	Methacrylonitrile	126-98-7
U152	2-Propenenitrile, 2-methyl-	126-98-7
U153	Methanethiol	74-93-1
U153	Methyl mercaptan	74-93-1
U153	Thiomethanol	74-93-1
U154	Methanol	67-56-1
U155	Methapyrilene	91-80-5
U156	Carbonochloridic acid, methylester	79-22-1
U156	Methyl chlorocarbonate	79-22-1
U156	Methyl chloroformate	79-22-1
U157	3-Methylcholanthrene	56-49-5
U158	MBOCA	101-14-4
U158	4,4'-Methylenebis(2-chloroaniline)	101-14-4
U159	Methyl ethyl ketone	78-93-3
U160	Methyl ethyl ketone peroxide	1338-23-4
U161	Methyl isobutyl ketone	108-10-1
U162	Methyl methacrylate	80-62-6
U163	Guanidine, N-methyl-N'-nitro-N-nitroso-	70-25-7
U164	Methylthiouracil	56-04-2
U165	Naphthalene	91-20-3
U166	1,4-Naphthoquinone	130-15-4
U167	alpha-Naphthylamine	134-32-7
U168	beta-Naphthylamine	91-59-8
U169	Nitrobenzene	98-95-3
U170	4-Nitrophenol	100-02-7
U170	p-Nitrophenol	100-02-7
U171	2-Nitropropane	79-46-9
U172	N-Nitrosodi-n-butylamine	924-16-3
U173	N-Nitrosodiethanolamine	1116-54-7
U174	N-Nitrosodiethylamine	55-18-5
U176	N-Nitroso-N-ethylurea	759-73-9
U177	N-Nitroso-N-methylurea	684-93-5

RCRA Code	Chemical Name	CAS #
U178	N-Nitroso-N-methylurethane	615-53-2
U179	N-Nitrosopiperidine	100-75-4
U180	N-Nitrosopyrrolidine	930-55-2
U181	5-Nitro-o-toluidine	99-55-8
U182	Paraldehyde	123-63-7
U183	Pentachlorobenzene	608-93-5
U184	Pentachloroethane	76-01-7
U185	PCNB	82-68-8
U185	Pentachloronitrobenzene	82-68-8
U185	Quintozene	82-68-8
U186	1,3-Pentadiene	504-60-9
U187	Phenacetin	62-44-2
U188	Phenol	108-95-2
U189	Sulfur phosphide	1314-80-3
U190	Phthalic anhydride	85-44-9
U191	2-Methylpyridine	109-06-8
U191	2-Picoline	109-06-8
U192	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl	23950-58-5
U192	Pronamide	23950-58-5
U193	Propane sultone	1120-71-4
U193	1,3-Propane sultone	1120-71-4
U194	n-Propylamine	107-10-8
U196	Pyridine	110-86-1
U197	p-Benzoquinone	106-51-4
U197	Quinone	106-51-4
U200	Reserpine	50-55-5
U201	Resorcinol	108-46-3
U202	Saccharin (manufacturing)	81-07-2
U202	Saccharin and salts	81-07-2
U203	Safrole	94-59-7
U204	Selenious acid	7783-00-8
U205	Selenium sulfide	7488-56-4
U206	Streptozotocin	18883-66-4
U207	1,2,4,5-Tetrachlorobenzene	95-94-3
U208	Ethane, 1,1,1,2-tetrachloro-	630-20-6
U208	1,1,1,2-Tetrachloroethane	630-20-6
U209	1,1,2,2-Tetrachloroethane	79-34-5
U210	Perchloroethylene	127-18-4
U210	Tetrachloroethylene	127-18-4
U211	Carbon tetrachloride	56-23-5
U213	Furan, tetrahydro-	109-99-9

RCRA Code	Chemical Name	CAS #
U214	Thallium(I) acetate	563-68-8
U215	Thallium(I) carbonate	6533-73-9
U215	Thallous carbonate	6533-73-9
U216	Thallium chloride TlCl	7791-12-0
U216	Thallous chloride	7791-12-0
U217	Thallium(I) nitrate	10102-45-1
U218	Thioacetamide	62-55-5
U219	Thiourea	62-56-6
U220	Toluene	108-88-3
U221	Diaminotoluene	496-72-0
U221	Diaminotoluene	823-40-5
U221	Diaminotoluene (mixed isomers)	25376-45-8
U221	Toluenediamine	25376-45-8
U222	o-Toluidine hydrochloride	636-21-5
U223	Benzene, 1,3-diisocyanatomethyl-	26471-62-5
U223	Toluenediisocyanate (mixed isomers)	26471-62-5
U223	Toluene diisocyanate (unspecified isomer)	26471-62-5
U225	Bromoform	75-25-2
U225	Tribromomethane	75-25-2
U226	Methyl chloroform	71-55-6
U226	1,1,1-Trichloroethane	71-55-6
U227	1,1,2-Trichloroethane	79-00-5
U228	Trichloroethylene	79-01-6
U234	1,3,5-Trinitrobenzene	99-35-4
U235	Tris(2,3-dibromopropyl) phosphate	126-72-7
U236	Trypan blue	72-57-1
U237	Uracil mustard	66-75-1
U238	Carbamic acid, ethyl ester	51-79-6
U238	Ethyl carbamate	51-79-6
U238	Urethane	51-79-6
U239	Benzene, m-dimethyl-	108-38-3
U239	Benzene, o-dimethyl-	95-47-6
U239	Benzene, p-dimethyl-	106-42-3
U239	m-Xylene	108-38-3
U239	o-Xylene	95-47-6
U239	p-Xylene	106-42-3
U239	Xylene (mixed isomers)	1330-20-7
U240	Acetic acid, (2,4-dichlorophenoxy)-	94-75-7
U240	2,4-D	94-75-7
U240	2,4-D Acid	94-75-7
U240	2,4-D, salts and esters	94-75-7

RCRA Code	Chemical Name	CAS #
U243	Hexachloropropene	1888-71-7
U244	Thiram	137-26-8
U246	Cyanogen bromide	506-68-3
U247	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis [4-methoxy-	72-43-5
U247	Methoxychlor	72-43-5
U249	Zinc phosphide (conc. <= 10%)	1314-84-7
U271	Benomyl	17804-35-2
U278	Bendiocarb	22781-23-3
U278	2,2-Dimethyl-1,3-benzodioxol-4-ol methylcarbamate	22781-23-3
U279	Carbaryl	63-25-2
U279	1-Naphthalenol, methylcarbamate	63-25-2
U280	Barban	101-27-9
U328	o-Toluidine	95-53-4
U353	p-Toluidine	106-49-0
U359	Ethanol, 2-ethoxy-	110-80-5
U359	2-Ethoxyethanol	110-80-5
U364	Bendiocarb phenol	22961-82-6
U367	Carbofuran phenol	1563-38-8
U372	Carbendazim	10605-21-7
U373	Propham	122-42-9
U387	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester	52888-80-9
U389	Triallate	2303-17-5
U394	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester	30558-43-1
U395	Ethanol, 2,2'-oxybis-, dicarbamate	5952-26-1
U404	Triethylamine	121-44-8
U409	Thiophanate-methyl	23564-05-8
U410	Thiodicarb	59669-26-0
U411	Phenol, 2-(1-methylethoxy)-, methylcarbamate	114-26-1
U411	Propoxur	114-26-1

B-3 Sewer Use – Prohibited Discharges

CITY OF TAMPA'S
WASTEWATER DISCHARGE AND INDUSTRIAL
PRETREATMENT STANDARDS
TECHNICAL MANUAL (full document)

SECTION 2 -GENERAL SEWER USE REQUIREMENTS
2.1 Prohibited Discharge Standards

A. It shall be unlawful for any person to discharge any pollutant(s), which cause pass through or interference.

B. It shall be unlawful for any person to discharge or deposit any of the following materials, waste materials, wastes, gases, or liquids into any sanitary sewer (except where these may constitute occasional intermittent inclusions in the wastewater discharged from residential premises):

1. Any pollutant which creates a fire or explosion hazard in the POTW including, but not limited to, waste streams with a closed cup flashpoint of less than one hundred forty (140) degrees Fahrenheit or sixty (60) degrees Centigrade using the test methods specified in 40 CFR 261.21.

2. Any water or wastes having a pH lower than 6.0 or higher than 11.0, or having any other corrosive properties capable of either causing damage or creating a hazard to structures, equipment and/or personnel of the Department. An excursion of greater than fifteen (15) minutes per day, lower than 6.0, and higher than 11.0, will be considered a violation. At no time shall the pH be less than 5.0 unless the Director stipulates in writing that the City's collection system and treatment facilities are specifically designed to accommodate such discharges. A variance to the upper pH limit may be granted if it has been determined to be beneficial to the Department. An application for the variance must be made in writing to the Director. The variance may be terminated at any time it is determined the discharge is causing damage or creating a hazard to structures, equipment and/or personnel of the Department.

3. Trucked or hauled pollutants, except at discharge points designated by the Department.

4. Any solid or viscous substance in quantities capable of causing obstruction to flow in sewers, or resulting in interference with the proper operation of the treatment works, including, but not limited to, ashes, cinders, ceramic wastes, sand, mud, straw, shavings, thread, glass, rags, metal, feathers, bones, tar, plastics, wood, paunch manure, insulation materials, fibers of any kind, stock or poultry feed, processed grains, viscera or other fleshy particles from meat, poultry, or seafood processing or packing plants, lime, or similar sludges.

5. Any pollutants, including oxygen-demanding pollutants (BOD), etc., discharged into any treatment works in such a flow rate or strength as to cause interference with the operation or performance of the treatment works.

6. Any waste, liquid or vapor at such a temperature as will create hazardous conditions within, or cause deterioration of the sanitary sewers, or inhibit the biological activity in the treatment works resulting in interference, but in no case heat in such quantities that the temperature of the influent at the treatment works exceeds forty (40) degrees Centigrade (one hundred four (104) degrees Fahrenheit). Unless a specific temperature is a condition of the user's wastewater discharge permit, no user shall discharge effluent into any sewer line of the treatment works exceeding sixty (60) degrees Centigrade (one hundred forty (140) degrees Fahrenheit).

7. Any water or waste containing more than one hundred (100) milligrams per liter of petroleum oil, non-

biodegradable cutting oils, or products of mineral origin.

8. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems.

C. It shall be unlawful for any person to discharge or deposit any of the following materials, waste materials, waste gases or liquids into any sanitary sewer; prohibited materials include, but are not limited to:

1. Any noxious or malodorous gas or any substance capable of creating a public nuisance or hazard to life, or preventing entry of workmen into the treatment plant or collection system for maintenance, inspection or repair.

2. Any waters or wastes having a color which is not removable by the existing wastewater treatment plant processes, and which causes the plant effluent to exceed color requirements for discharge to the receiving waters.

3. Any radioactive isotope in concentration greater than that permitted by the latest effective regulations promulgated under applicable federal or state law.

4. Any unpolluted wastewater of storm water runoff, groundwater, or landfill leachate.

5. Sludges, screenings, or other residues from the pretreatment of industrial wastes.

6. Medical wastes, except as specifically authorized by the Department.

7. Any toxic or poisonous substance or any other materials in sufficient quantity, either singly or by interaction with other pollutants, to injure or interfere with the wastewater treatment processes, or to contribute a hazard to humans or animals, or to cause a violation of the water quality standards for the stream or watercourse receiving the effluent from Department operated treatment works, or cause sludge products to be unsuitable for reclamation and reuse, or to exceed the limitations set forth in a pretreatment standard. A toxic pollutant shall include, but not be limited to, any pollutant identified pursuant to Section 307(a) of the Clean Water Act ("Act").

8. Detergents, surface-active agents, or other substances which may cause excessive foaming in the POTW

9. Wastewater containing floatable oils, fat or grease.

10. Any garbage that has not been properly shredded.

11. Any gasoline, benzene, naphtha, kerosene, toluene, xylene or other hydrocarbon solvents or oils, or other flammable or explosive liquids, solids or gases, or fuel tank bottom waters, except as specifically authorized by the Department.

12. Any contents removed from grease traps, or food services separators.

13. Any contents from septic tanks, except as authorized by the Department.

D. Pollutants, substances, or wastewater prohibited by this Section shall not be processed or stored in such a manner that they could be discharged to the POTW.

ST. PETERSBURG CITY CODE
Chapter 27 - UTILITIES
ARTICLE III. - SEWERS AND SEWAGE DISPOSAL
DIVISION 3. WASTEWATER COLLECTION AND TREATMENT (full document)

Sec. 27-307. General sewer use requirements; sampling and analytical requirements and pretreatment of wastewater.

(a) General discharge prohibitions. No person shall directly or indirectly discharge, cause or permit the discharge of any pollutant or wastewater which, acting alone or in conjunction with other substances present in the POTW, shall cause an interference with the operation or performance of the POTW or otherwise pass through the POTW. This prohibition includes but is not limited to the following discharges:

(1) Any substances 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 be injurious in any other way to the POTW or its operation. In no case shall pollutants or wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit (60 degrees Celsius), as determined by the test methods specified in 40 CFR 261.21, be discharged to the POTW. At no time shall two successive readings on an explosion hazard meter at the point of discharge into the system or at any point in the system be more than five percent, nor any single reading over ten percent, of the lower explosive limit (LEL) of the meter.

(2) Any substances capable of causing corrosive damage to structures, equipment or personnel of the POTW, but in no case discharges with a pH lower than 5.0 or higher than 11.5.

(3) Solid or viscous substances in quantities or of such size capable of causing obstruction to the flow of the sewers or interference with the operation of or which cause injury to the POTW including, but not limited to, uncomminuted garbage or food waste with particles greater than one-half inch in any direction, paper dishes, cups, milk containers, etc., either whole or ground by garbage grinders, animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, wastepaper, wood, plastics, gas, tar, asphalt residues, residues from refining or processing of fuel or lubricating oil, mud or glass grinding or polishing wastes.

(4) Any pollutant, including oxygen demanding (e.g., ethylene glycol) and conventional pollutants (BOD, COD, TSS, etc.), released at a flow rate or pollutant concentration which may reasonably be expected to cause interference with the POTW. In no case shall a user's discharge have a flow rate or contain concentration or quantities of pollutants that exceeds 1.5 times the average 24-hour concentration, quantities or flow.

(5) Any substance having a temperature which will inhibit biological activity in the POTW treatment plant resulting in interference, but in no case wastewater with a temperature at the introduction into the POTW which exceeds 40 degrees Celsius (104 degrees Fahrenheit). Unless a higher temperature is allowed under the user's IWDP, no user shall discharge into any sewer line or other appurtenance of the POTW, wastewater with a temperature exceeding 65.5 degrees Celsius (150 degrees Fahrenheit).
(6) Petroleum oil, nonbiodegradable cutting oil or products of mineral oil origin in excess of 100 parts per million, or any substance containing toxic pollutants or hazardous wastes of sufficient quantity, either singularly or by interaction with other pollutants which may reasonably be expected:

a. To injure or interfere with any wastewater collection system and/or wastewater treatment process;
b. To constitute a hazard to humans, animals or plants;
c. To create a toxic effect or pass through into the injection well system of the POTW; or
d. To create a toxic effect or pass through into the reclaimed water or sludge.

(7) Any water or waste containing fats, wax, grease, oils, or related substances of animal or vegetable origin, whether or not emulsified, in excess of 400 parts per million by weight, or which may solidify or become viscous at temperatures between 4.5 degrees Celsius (40 degrees Fahrenheit) and 65.5 degrees Celsius (150 degrees Fahrenheit). Specifically prohibited is the heating of the contents of grease traps and subsequent discharge to the sewer system. The POD may allow discharges in excess of this standard as a permit condition upon the submission by the user of a technical evaluation prepared by professional engineer or other similar licensed professional demonstrating that the subject wastewater will have no adverse affects to the wastewater collection and treatment facilities or to the biosolids and reclaimed water generated from those facilities. Wastewater exceeding the limitations provided herein shall contain no visible sheen, shall not discharge any solid grease particles, shall not cause an accumulation of grease or create other unacceptable impact to the collection system downstream of the permitted facility, and shall not cause or contribute to any unacceptable impacts to the water reclamation facility or the biosolids and reclaimed water generated by that facility.

(8) Any stormwater, surface water, unpolluted groundwater, roof runoff, subsurface drainage, uncontaminated cooling water, swimming pool water or unpolluted industrial process waters, provided however, the same may be discharged into approved storm sewers, but not sanitary sewers. Such discharge which is not acceptable for discharge into the stormwater system according to federal or State law may be considered acceptable for sanitary discharge upon issuance of a temporary industrial wastewater discharge permit.

(9) Any substances which result in the presence of toxic gases, vapors or fumes within the POTW or noxious or malodorous substances other than normal sewage which either alone or by interaction with other wastes are sufficient to cause acute worker health and safety problems, create a public nuisance or hazard to life, or are sufficient to prevent entry into the POTW or its appurtenances for maintenance, inspection and repair.

(10) Any substance which may reasonably be expected to cause the POTW's effluent or any other product of the POTW such as residues, sludges or scums to be unsuitable for reclamation and reuse or to interfere with the reclamation process. This shall particularly include but not be limited to all forms of copper containing chemicals used for root control in sewers. In no case shall a discharge to the POTW be permitted which causes the POTW to be in noncompliance with sludge use or disposal criteria, guidelines or regulations developed under section 405 of the Act or any other federal or State law or regulation applicable to any reclaimed product of the POTW.

(11) Any substance which may reasonably be expected to cause the POTW to violate its NPDES or State disposal system permit or the State or federal water quality standards.

(12) Wastewater or wastes containing substances which are not reasonably amenable to treatment or reduction by the ordinary operation of the POTW.

(13) Any substances containing quantities of radioactive wastes or isotopes in excess of applicable State or federal regulations or permits issued by State or federal agencies.

(14) Any concentrated dye wastes, spent tanning solutions, or other wastes which are highly colored, or wastes which are of unusual volume, concentration of solids, or composition that may create obstruction to the flow in sewers, interfere with the POTW or impart color to the POTW effluent.

(15) Substances causing conditions at the POTW which violate any statute, rule or regulation of any public agency of this State or the United States.

(16) Any trucked or hauled pollutants except those lawfully discharged at specific points designated by the POD.

(17) Substances having constituents and concentrations in excess of those listed in this chapter.

(18) Any discharges containing compounds that are labeled for the control of pest species of any type, such as, but not limited to, acaricides, bactericides, fungicides, herbicides, insecticides, molluscicides, nematicides and rodenticides.

MANATEE COUNTY
DIVISION 3. - SEWER USE ORDINANCE (full document)

Sec. 2-31-41. - General sewer use requirements.
(a) Prohibited discharge standards.

(1) General prohibitions. No person or user, including an owner or operator of a private sewage disposal system, shall introduce or cause to be introduced into the county's sanitary sewer collection system any pollutant or wastewater which causes pass through or interference. No person or user, including an owner or operator of a private sewage disposal system, shall intentionally release or discharge sewage, other wastewater, or residuals, without providing proper treatment, to the surface of the ground or surface water body. These general prohibitions apply to all users of the sanitary sewer collection system, whether or not they are subject to categorical pretreatment standards or any other national, state, or local pretreatment standards or requirements.

(2) Specific prohibitions. No person or user shall introduce or cause to be introduced into the county's sanitary sewer collection system the following pollutants, substances, or wastewater:

a. Pollutants which create a fire or explosive hazard in the sanitary sewer collection system, including, but not limited to, wastewater streams with a closed-cup flashpoint of less than 140°F (60°C) using the test methods specified in Chapter 62-730, Florida Administrative Code (F.A.C.), as amended;

b. Wastewater having a pH less than 5.0 or more than 11.5, or otherwise causing corrosive structural damage to the POTW or equipment;

c. Solid or viscous substances in amounts which will cause obstruction of the flow in the POTW resulting in interference, but no solids greater than fifteen (15) millimeters in any dimension;

d. Pollutants, including oxygen-demanding pollutants (BOD, CBOD, COD, etc.), released in a discharge at a flow rate and/or pollutant concentration which, either singly or by interaction with other pollutants, will cause interference with the county's receiving wastewater treatment plants;

e. Heat in amounts which will inhibit biological activity in a wastewater treatment plant resulting in interference, but no heat in any quantity that results in the discharge from the wastewater treatment plant having a temperature greater than 104°F (40°C), unless the director approves alternate temperature limits in accordance with Rule 62-302.520, Florida Administrative Code (F.A.C.), as amended;

f. Petroleum oil, nonbiodegradeable cutting oil, or products of mineral oil origin, in amounts that will cause interference or pass through;

g. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause corrosion or destruction of pumps, lines, pipes, manholes, or other portions of the POTW or acute worker health or safety problems;

h. Trucked or hauled pollutants, except at discharge points designated by the director in accordance with this division;

i. Noxious or malodorous liquids, gases, solids, or other wastewater which, either singly or by interaction with other wastes, are sufficient to create a public nuisance or safety hazard, or to prevent entry into the sewers for maintenance or repair;

j. Wastewater which imparts color which cannot be removed by the treatment process, such as, but not

limited to, dye wastes and vegetable tanning solutions, which consequently imparts color to the treatment plant's effluent, thereby violating the county's FDEP permit;

k. Wastewater containing any radioactive wastes or isotopes, except in compliance with applicable state or federal regulations;

l. Stormwater, surface water, groundwater, artesian well water, roof runoff, subsurface drainage, swimming pool drainage, condensate, deionized water, noncontact cooling water, and unpolluted wastewater, unless specifically authorized by the director;

m. Biosolids, screenings, or other residues from the pretreatment of industrial wastes;

n. Medical wastes, except as specifically authorized by the director in a wastewater discharge permit;

o. Wastewater causing, alone or in conjunction with other sources, a treatment plant's effluent to fail toxicity testing, or rendering the treatment plant's effluent unsuitable or unusable for reuse, including agricultural or landscape irrigation;

p. Detergents, surface-active agents, or other substances which may cause excessive foaming, interference, or pass-through in the POTW;

q. Wastewater causing two (2) readings on an explosion hazard meter at the point of discharge into the POTW or at any point in the POTW of more than five (5) percent, or any single reading over ten (10) percent, of the lower explosive limit of the meter;

r. Fats, oils, or greases of animal or vegetable origin in concentrations that cause or have the potential to cause blockages or overflows in the POTW; or

s. Chemicals, solvents, enzymes, emulsifiers, or other grease cutters or additives designed to liquefy or emulsify the captured grease so it can pass into the POTW.

(3) The pollutants, substances, and wastewater prohibited in paragraph (2) above shall not be processed or stored in such a manner that they could be discharged into Manatee County's sanitary sewer collection system.

Appendix C: Hazardous Materials Shipping and Receiving Guide

C-1 Shipping Hazardous Materials

Since 1990, the U.S. Department of Transportation (DOT) has regulated the transport of "hazardous materials" in all modes of transportation (air, ground and sea). Transportation of "dangerous goods" by air has been regulated by the International Air Transport Association (IATA) since 1956. The DOT and IATA regulations are intended to ensure that all who encounter a shipment of hazardous materials are properly informed of the hazards presented by the materials, and the measures necessary for their safe transport.

C-2 What are Hazardous Materials and Dangerous Goods?

Hazardous materials are substances or materials, which have been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce. The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (HMT), and materials that meet the defining criteria for hazard classes and divisions in 49 CFR 173.

Dangerous goods are articles or substances, which are capable of posing a significant risk to health, safety or property when transported by air. The transportation of these articles and substances is regulated under the IATA Dangerous Goods Regulations. DOT and IATA regulations are similar, but are not always the same. For example, dry ice shipped via ground transportation is not regulated as a hazardous material; however, when shipped by air, dry ice is considered a dangerous good.

Hazardous materials and dangerous goods include items such as laboratory chemicals, radioactive materials, compressed gases, biological agents, dry ice (when shipped by air) and equipment or instruments that contain hazardous materials or dangerous goods. To comply with DOT and IATA regulations, these materials must be properly classified, packaged, labeled, documented and handled.

C-3 USF Procedures for Offering Hazardous Materials for Shipment

Following these procedures will help to ensure that your package will arrive at its destination on time and intact. More importantly, it will ensure that everyone involved in the transport of the material will know what it is and how to deliver it safely. The following procedures apply to all hazardous material/dangerous goods packages, except Class 6.2 - Infectious Substances and Class 7 - Radioactive Materials. For assistance shipping Class 6.2 and Class 7 materials, contact Research & Integrity Compliance. The RIC Biosafety office provides training for shipping Class 6.2 materials (register here).

In order to ship hazardous materials and/or dangerous goods laboratory personnel must successfully complete the training requirements specified in the DOT and/or IATA regulations (49 CFR 172, Subpart H and DGR 1.5 respectively). See "Training Requirements" below. Once training has been completed, laboratory personnel may package, label and complete the proper shipping papers for the material, and arrange for shipping by a licensed commercial carrier. A partial list of package supply companies and commercial carriers follows.

Package Supply Companies

Here are some suppliers of UN Performance-Oriented Packaging and labels.

- Air Sea Containers
- Labelmaster
- Grainger, Inc.
- Global Industrial, Inc.
- Federal Industries Corp.

Commercial Carriers of Hazardous Materials

- FedEx
- World Courier

EH&S does not endorse any of the companies listed above. The list is provided for informational purposes only.

C-4 Receiving Hazardous Materials

Hazardous materials received at USF via domestic carrier are regulated during transport by the U.S. Department of Transportation (DOT). These materials have specific packaging and labeling requirements. All packages containing hazardous materials display a diamond shaped DOT label(s) that fall into one or more of nine categories or hazard classes.

If your area receives any package displaying these types of labels, the following procedures should be followed:

- Packages displaying a "Explosive" label (Hazard Class 1) - call EH&S
- Packages displaying a "Radioactive" label (Hazard Class 7) - Should not be accepted. These types of packages should go directly to the USF Radiation Safety Office. Note: Laboratories at Tampa General, Bayboro Campus, and All Children's Research Center may elect to take direct receipt (direct receipt option), with Radiation Safety Office approval and in compliance with procedures outlined in the USF Radiation Safety Manual.
- If packages displaying a "Radioactive" label (Hazard Class 7) are accidentally accepted, call the Radiation Safety Manager at (813) 974-1194.
- All packages received displaying labels with Hazard Classes 2-6 and 8-9 can be campus delivered as any other package unless they are damaged or leaking.
- Hazardous material packages should be campus delivered immediately or within three hours after receiving for refrigerated material or within 24 hours for all other packages.
- While hazardous material packages are awaiting campus delivery, segregate them according to the hazardous material segregation table.
- If packages are damaged or leaking at the time of delivery, do not accept from carrier, and call EH&S.
- If a package is damaged, or leaks, after the carrier has delivered it, call EH&S. Do not handle, cordon off

the area and notify other personnel working in the area.

C-5 Training Requirements

Anyone who…

- Loads, unloads or handles hazardous material/dangerous goods packages;
- Determines acceptable shipping containers;
- Determines whether a material to be shipped is a hazardous material or dangerous good;
- Packages hazardous materials/dangerous goods for shipment;
- Labels hazardous materials/dangerous goods packages;
- Fills out shipping papers; and/or
- Transports hazardous materials

…must be trained according to the training requirements specified in the DOT and IATA regulations (when shipping by air). The training requirements are specified in 49 CFR 172, Subpart H and DGR 1.5 respectively. For assistance in receiving training contact EH&S at 813-974-4036.

C-6 Laboratories Shipping Hazardous Chemicals

Laboratories that ship hazardous chemicals (other than certain small quantities for analysis) are considered chemical manufacturers or distributors under the Hazard Communication Standard, and must ensure that any hazardous chemicals leaving the laboratory have manufacturer's labels that include the minimum content specified in the Hazard Communication Standard. In addition, the name and address of the University department responsible for the hazardous chemical(s) is required. Additionally, laboratories shipping hazardous chemicals must provide a GHS-compliant Safety Data Sheet to distributors or other employers who will receive the hazardous chemicals. Contact EH&S for shipping information and for SDS requirements.

The following resources may be of assistance in creating Safety Data Sheets:

- Hazard Communication Standard: Safety Data Sheets – OSHA Brief 3514
- OSHA Quick Card - Hazard Communication Standard Pictograms

For additional assistance, contact EH&S at (813) 974-4036.

C-7 Additional Information: US Postal Service Suspicious Package Guidelines

The following link refers to information about suspicious packages that may arrive through the mail or other parcel delivery services: Suspicious Mail Poster

Appendix D: Hazardous Material Emergencies and Spills

The following guidelines and procedures are to be used in case of chemical emergencies or spills. Contact EH&S for more detailed information on any of these subjects.

D-1 Chemical Exposures

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. Seek medical attention immediately.

Eye Contact: If a chemical has been splashed into the eyes, immediately wash the eye and inner surface of the eyelids with copious amounts of water for 15 minutes, lifting upper and lower eyelids occasionally. Check for and remove any contact lenses at once. Seek medical attention immediately.

Ingestion: Consult SDS, and/or call the Poison Control Information Center at 1-800-222-1222. Follow directions and seek medical attention immediately.

Minor Skin Contact: Promptly flush the affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention.

Major Skin Contact: If chemicals have been spilled over a large area of the body, quickly remove all contaminated clothing while using the safety shower. Repeat if pain returns. Wash off chemicals by using a mild detergent or soap and water. Do not neutralize chemicals or apply salves or bandages. Leave affected area clean and open to the air. Seek medical attention immediately.

Remember that for some chemicals, such as hydrofluoric acid, effects resulting from exposure may not become apparent until hours or days later. Consult the SDS for any chemical to which someone has been exposed, even if no immediate injury is apparent.

If clothing is on fire, help the individual to the floor and roll that person around to smother the flames. If a safety shower is immediately available, douse the person with water as running to a remote shower will only fan the flames.

Report instances of chemical exposure to EH&S after medical attention has been received.

D-2 Employee Accident Reporting & Workers' Compensation Procedures

All employees who work with hazardous chemicals have the opportunity to receive medical attention, including follow-up exams, under the following circumstances:

- When an employee develops signs or symptoms associated with a hazardous chemical that they may have been exposed to, they should receive an appropriate medical exam.
- When an event such as a spill, leak, or explosion occurs resulting in the likelihood of a hazardous exposure, medical consultation should be provided to determine the need for a medical examination.

How to Report a Work-related Injury or Illness

All work-related injuries or illnesses are to be reported by the supervisor or department designee by telephone to

AmeriSys at **800-455-2079 (toll free)**. The injured or ill employee should be present for the call so the employee's injuries or illness may be triaged, and the appropriate medical care provided. In case of emergency, call 911 for immediate medical care for the injured or ill employee. Then, the supervisor or department designee must call AmeriSys at 800-455-2079.

Employee's Responsibility

When an incident occurs, the employee must report all injuries or illnesses to his/her supervisor or department designee immediately (**no exceptions**).

Supervisor's (or Department Designee's) Responsibility – What to Do

- Call AmeriSys at 1-800-455-2079 to report the injury or illness. Except in cases of emergency, the injured or ill employee must be present with the supervisor when the injury or illness is reported.
- Within 24 hours, complete the appropriate report (See the USF Reporting Procedures.)
- Have the following information ready when you call AmeriSys to report an injury: Injured/ill employee's home address, home telephone number, date of birth, social security number, date of employment, and salary.
- Once AmeriSys has taken the required information over the telephone, the intake specialist will assess the employee's medical needs and refer the injured/ill employee to a medical facility as appropriate
- An AmeriSys nurse case manager will obtain the results of the initial medical visit including diagnosis, treatment plan and any injury or illness related restrictions. This information will be provided to the supervisor immediately after the initial medical visit. Be prepared to speak with the nurse case manager regarding return-to-work restrictions.
- Take prompt action to correct any safety hazards.

D-3 Student Accident/Illness Reporting Procedures

Students must report accidents, injuries, and illnesses that occur in laboratories to the appropriately responsible person (i.e., Teaching Assistant, Lab Manager, and Principal Investigator). If a student **is not** acting as an employee or volunteer at the time of injury, illness, or exposure to chemicals caused by participating in laboratory activities, the student should seek medical assistance, if needed, at Student Health Services or a local medical clinic.

If a student **is** acting as an employee or volunteer at the time of injury, illness, or exposure to chemicals caused by participating in laboratory activities, the student will be referred for medical treatment, if necessary, by AmeriSys. The person supervising the student employee or volunteer must complete the appropriate report within 24 hours. (See the USF Reporting Procedures.)

D-4 Emergencies

All laboratory personnel must know what to do in case of an emergency. Laboratory work must not be undertaken without knowledge of the following points:

- How to report a fire, injury, chemical spill, or other emergency.
- The location of emergency equipment such as safety showers and eyewash fountains.

- The location of fire extinguishers and spill control equipment.
- The locations of all available exits for evacuation from the laboratory.
- The location of your emergency evacuation meeting area.

The Principal Investigator must ensure that all laboratory personnel are familiar with this information.

Laboratory personnel should be aware of their level of expertise with respect to the use of fire extinguishers and emergency equipment, response to chemical spills, and ability to treat injuries. They should not take actions outside the limits of their expertise, but instead, should call on trained personnel for assistance.

Post emergency telephone numbers and the telephone numbers of individuals responsible for the laboratory by the laboratory telephone and on signage at the laboratory entrance. This information must be kept up to date. Consult Appendix E for the Lab Safety Information posting form.

D-5 Emergency Procedures

- Call 911 immediately for all fires and any accidents or spills with injuries that require urgent medical attention.
- Call EH&S at (813) 974-4036 during normal business hours for accidents or spills without injuries or with injuries that do not require urgent medical attention. After normal business hours and on weekends and holidays call 911 or University Police. Be prepared to provide detailed information as to your location including the street address.
    - USF Tampa Police: (813) 974-2628
    - USF St. Pete Police: (727) 873-4140
    - USF Sarasota-Manatee Police: (941) 487-4210
- Emergencies involving biological agents, radiation or radioactive materials must be reported to Research Integrity & Compliance at (813) 974-5638. After normal business hours and on weekends and holidays call University Police.

D-6 Management of Spills

Hazardous chemical, biological or radiological spills can be handled effectively by lab workers when a plan of action has been developed. To respond to any type of spill, lab personnel must be adequately trained. Contact EH&S and/or Research Integrity & Compliance for training assistance. Spill awareness and/or procedures include the following:

- The potential location of spills.
- The quantities of material that might be released.
- Chemical, physical and hazardous properties of the material. This information may be obtained from the (Material) Safety Data Sheet or label.
- The types of personal protection equipment that is needed for cleanup.

- Post location of spill kits. Consult Appendix E for the Spill Kit Location form.

The following table presents a list of *suggested* materials for spill control kits. **Note: Not all the materials on this list are required to complete a spill control kit, only those that apply to a particular laboratory.**

COMPONENTS	QTY[1]	PURPOSE
Plastic tote	1 each	hold kit contents below
Clay absorbent (i.e. Oil-Dry, Kitty Litter)	5 lbs.	absorbent for organic solvents, oil spills
Sodium bicarbonate	5 lbs.	neutralizes acid (base) spills
Magic Sorb® or vermiculite	5 lbs.	all purpose (except Hydrofluoric Acid)
Sodium Hypochlorite (bleach) or other EPA-approved disinfectant	1 gal.	disinfectant for biohazardous spills
Absorbent pads/ paper	6 units	absorb radioactive/biohazardous spills
Silver Shield, nitrile, or neoprene gloves	2 pairs	PPE
Disposable gloves	1 box	PPE
Safety goggles	2 pairs	PPE
Whisk broom or bench brush	2 each	collect spill waste
Dustpan (non-sparking)	2 each	collect spill waste
Polyethylene bags	6 each	collect and dispose waste
Impermeable red biomedical waste bags	6 units	dispose biomedical waste
Tongs or forceps	1 each	picking up sharps/syringes
Duct tape	1 roll	seal spill waste in bag
Other (as needed)		

[1]These quantities are suggested amounts per laboratory. Items may be added to or deleted from the spill kit depending on the variety and quantity of chemicals used in a laboratory. Additional items can include absorbent towels, spill pillows, mops, Radiacwash, etc.

Simple Chemical Releases

A simple chemical release is generally small in quantity, gradual in dispersion, and easy to contain. Simple releases

may be managed with a laboratory spill kit. The Principal Investigator or the laboratory supervisor must be informed when this type of release occurs. The following are some routine procedures to use for a simple chemical spill:

- Neutralize acids and bases whenever possible. Use baking soda (sodium bicarbonate) or some other appropriate neutralizer. (Never neutralize a spill on skin, use water.)
- Control and absorb liquid releases. Use absorbent materials (Speedi Dri, oil dry, spill socks, pads, etc.) to dike the contaminated areas and prevent the spread of a liquid release.
- Dispose of used absorbent materials properly. After cleaning the release area, place used absorbent materials and disposable PPE in a properly labeled solid waste container and contact EH&S for disposal. Label all disposal bags with the names of the spilled chemicals and the approximate amounts. Also, include on the label "contains broken glass," where appropriate.
- Decontaminate the area and affected equipment. Increase ventilation to the area by using fans or opening windows or fume hoods if available. Contact EH&S for an indoor air quality assessment if necessary.
- Always restock the spill control kit after use.

Complex Chemical Releases

Complex chemical releases require outside assistance from properly trained individuals. These involve the release of large amounts of chemicals or chemicals of high toxicity. Evacuate the area, contact the University or Local Police and EH&S, and have all personnel involved wait in a predetermined evacuation area. See also the USF Spill & Release Procedures.

Mercury Releases

Elemental mercury can be absorbed through the skin, inhaled as a gas, or ingested. Although it is a liquid at room temperature, it is constantly emitting vapors that are colorless, odorless, and tasteless. **The preferred mercury spill cleanup method is to isolate the area and immediately call EH&S for cleanup.**

Where do I find the …
Chemical Inventory & SDSs:
First Aid Kit:
Spill Kit:
Fire Extinguisher(s):
Phone:
Building Address:

LABORATORY SAFETY INFORMATION

PI/SUPERVISOR: _____ **OFFICE PHONE:** _____ **CELL PHONE:** _____

LAB SAFETY CONTACT: _____ **OFFICE PHONE:** _____ **CELL PHONE:** _____

DEPARTMENT: **BUILDING:** **ROOM:** _____

CHEMICAL HAZARDS

- ☐ AIR/WATER REACTIVES
- ☐ CARCINOGENS
- ☐ CORROSIVES
- ☐ EXPLOSIVES
- ☐ FLAMMABLES
- ☐ GAS CYLINDERS
- ☐ OXIDIZERS
- ☐ POISONS/TOXINS
- ☐ PYROPHORICS
- ☐ WASTE CHEMICALS

OTHER HAZARDS

☐ ANIMALS ☐ BIOLOGICAL ☐ LASER ☐ RADIATION

IMPORTANT CONTACTS

	CAMPUS POLICE	FACILITIES MANAGEMENT
TAMPA :	(813) 974-2628	(813) 974-2845
SARASOTA :	(941) 487-4210	(941) 487-4240
ST. PETE :	(727) 873-4444	(727) 873-4135

ENVIRONMENTAL HEALTH & SAFETY : (813)974-4036

WORKERS' COMPENSATION (AmeriSys) : 800-455-2079

CALL 911 FOR EMERGENCIES

BUILDING ADDRESS:

DATE FORM LAST UPDATED : _____

UNIVERSITY OF SOUTH FLORIDA

Environmental Health & Safety
Laboratory Safety Checklist

Building/Room Number:	PI/Supervisor:
Purpose: Routine☐ Follow up☐	Lab Hazards: Chemical ☐ Biological ☐
College:	Department:

1	Documentation	Yes	No	S	Comments
1.1	Emergency telephone numbers posted				
1.2	Emergency information current in lab				
1.3	Location of first aid & spill kits, fire extinguishers posted				
1.4	Updated chemical inventory available				
1.5	Chemical Hygiene Plan (CHP) is readily available to all faculty, staff, & students				
1.6	SDS access to all personnel in lab				
1.7	All accidents and spills reported to supervisor and EH&S				
2	**Training**	**Yes**	**No**	**S**	**Comments**
2.1	Lab training has been completed for all personnel (**Initial training is a critical deficiency**)				
2.2	Personnel have received lab-specific safety training				
2.3	Lab-specific SOPs have been read and signed by applicable lab personnel				
2.4	Chemical-specific SOPs are developed for extremely hazardous chemicals				
2.5	Process-specific SOPs include safety procedures for the handling of hazardous materials				
2.6	Equipment specific SOPS are developed for the safe use of machinery				
3	**Chemical Storage**	**Yes**	**No**	**S**	**Comments**
3.1	Chemical containers labeled to identify contents				
3.2	Stock solutions and wash bottles labeled				
3.3	Non-flammable refrigerators & flammable cabinets labeled				
3.4	Flammables stored in flammable cabinets/refrigerators				
3.5	Quantity of flammable liquids does not exceed storage limits				
3.6	Chemicals are segregated by hazard class (acids,bases, etc.)				
3.7	Chemicals not stored on floor, fume hoods, bench tops				
3.8	Chemical containers are kept closed when not in use				
3.9	Leaking chemical containers must be placed in secondary containment and submitted for disposal				
3.10	Time sensitive chemicals are less than one year old				
4	**Housekeeping**	**Yes**	**No**	**S**	**Comments**
4.1	Emergency exits unobstructed				
4.2	Work areas free of clutter				
4.3	Broken glassware disposed in box labeled “Broken Glass”				
4.4	Broken glass container lined with non-red plastic bag				
4.5	Needles, razor blades, scalpels and other sharps are not left unattended when not in use				

4.6	Food, drinks, and applying cosmetics prohibited in lab				
5	**Compressed Gas Cylinders**	**Yes**	**No**	**S**	**Comments**
5.1	Properly labeled, segregated & stored upright				
5.2	Attached to a permanent fixture				
5.3	Empty cylinders are marked, and appropriately managed				
5.4	Regulators are not obstructed				
5.5	Capped when not in use				
6	**Safety and Emergency**	**Yes**	**No**	**S**	**Comments**
6.1	Personal protective equipment (PPE) available				
6.2	PPE worn by personnel while working in lab				
6.3	If NIOSH approved respirators used, copy of written Respiratory Protection Plan accessible				
6.4	If NIOSH approved respirators are needed, personnel has been enrolled in Respiratory Protection Program				
6.5	Fume hoods have current inspection/certification				
6.6	Sashes kept closed when not in use				
6.7	Air flow monitor operates appropriately				
6.8	Emergency eyewash/safety shower accessible				
6.9	Eyewashes flushed weekly, safety showers flushed quarterly				
6.10	Expired contents removed from required first aid & spill kits				
6.11	Monitors indicate negative pressure relative to all entrances				
7	**Hazardous Waste**	**Yes**	**No**	**S**	**Comments**
7.1	Containers labeled "Hazardous Waste" with contents and nature of hazard				
7.2	Hazardous waste stored in a designated Satellite Accumulation Area (SAA)				
7.3	Hazardous wastes are being stored in compatible containers				
7.4	Waste segregated by hazard class within the SAA				
7.5	Hazardous waste containers kept closed when not in use				
7.6	All solder and scrap metal are collected for recycling or disposal as hazardous waste				
7.7	Hazardous waste-contaminated rags are managed as hazardous waste				
7.8	Used mercury containing lamps managed appropriately				
7.9	Spent lead-acid and recyclable batteries are being recycled				
7.10	Hazardous pharmaceutical waste is collected for disposal				
7.11	All chemical spills have been appropriately decontaminated and surfaces cleaned regularly				
7.12	Pickup requests have been made for the removal of all full waste containers.				
8	**Fire Safety**	**Yes**	**No**	**S**	**Comments**
8.1	Exit signs illuminated and emergency lights operational				
8.2	No permanent use of extension cords				
8.3	Breaker panels are accessible				
8.4	Fire extinguisher inspected monthly				

8.6	Fire drills & start-up/shutdown procedures tested semi-annually				
8.7	Electrical cords in good condition				
8.8	All storage kept at least 18" below fire sprinklers				
8.9	Heat –generating lab equipment (autoclave, hot plate, water bath) is used according to manufacturer's safety				
9	**Biomedical Waste (BMW)**	**Yes**	**No**	**S**	**Comments**
9.1	Copy of BMW plan available				
9.2	BMW Training documentation available				
9.3	BMW contained at point of generation				
9.4	Sharps disposed of in sharps container				
9.5	No recapped needles in sharps container				
9.6	Non-sharp biomedical waste disposed in red bags				
9.7	Red bags meet requirements as outlined by FAC 64E-16.004 and copy of certification is available				
9.8	Red bags placed in outer container that is rigid, leak/puncture resistant, and labeled with the international biohazard symbol				
9.9	All outer reusable containers constructed of smooth, easily cleanable materials & decontaminated after each use				
9.10	BMW spill kit available				
9.11	All BMW spills properly decontaminated				
9.12	BMW bags and sharps boxes labeled according to the USF Biomedical Waste Plan prior to disposal				
9.13	BMW containers are not overflowing				
9.14	Sharps boxes are disposed of at ¾ full OR 30 days after first non-sharps item is placed in container				
9.15	BMW is separated from chemical waste				
9.16	Red bags disposed of within 30 days after first BMW item is placed in bag				
9.17	Generator is properly disposing of BMW containers to the appropriate vendor pick-up container				
9.18	BMW bags are used for biomedical waste only (i.e. bags not used in broken glass containers)				
9.19	Access to outdoor storage areas secured and conspicuously marked with a 6 inch international biohazard symbol				
9.20	Hand washing areas available				
9.21	Proper PPE used when handling BMW				
9.22	BMW transported to the waste storage areas via cart				

Additional safety concerns:

S: Serious finding that must be corrected within 48 hours or less, depending on severity of finding.