

FLORIDA INTERNATIONAL UNIVERSITY

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UNIVERSITY SAFETY COMPLIANCE GUIDE

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LABORATORY SAFETY

SECTION 600

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ENVIRONMENTAL HEALTH & SAFETY,  
INSURANCE & EMERGENCY MANAGEMENT SERVICES

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\* Duplicate USCG documents are listed due to their pivotal role in laboratory safety.

## **USCG 101 - BLOODBORNE PATHOGENS EXPOSURE\***

**Last Update: 05/01/01**

### **PURPOSE**

To protect employees from the risks of infection with the Human Immunodeficiency Virus (HIV), Hepatitis B virus, or other bloodborne pathogens; and to comply with the requirements of the OSHA Standard 29 CFR, 1910.1030 Bloodborne Pathogens.

### **DEFINITIONS**

**Blood:** human blood, human blood components, and products made from human blood.

**Bloodborne Pathogens:** pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

### **Other Potentially Infectious Materials:**

- The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.
- Any unfixated tissue or organ (other than intact skin) from a human (living or dead).
- HIV-containing cell or tissue cultures, organ cultures, and HIV-or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.
- Occupational Exposure: reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

### **GUIDELINES**

These guidelines apply to all University personnel, employees, students and visitors, who are exposed to blood or other potentially infectious materials while on University premises or involved in University sponsored activities.

1. Each Dean, Director or Department head, in consultation with the Department of Environmental Health & Safety and the FIU Office of Human resources is responsible for determining the job classifications that are subject to regulation by the OSHA Bloodborne Pathogens Standard, hereafter referred to as the Standard.
2. The Department of Environmental Health & Safety shall maintain a current Exposure Control Plan (ECP) for the University.

3. Deans, directors, chairpersons, principal investigators, laboratory instructors, and line supervisors shall assure compliance with the requirements established in the University ECP. Individuals responsible for assuring compliance with this standard shall correct violations and modify inappropriate practices upon detection. Disciplinary actions shall be taken as needed.
4. Hepatitis B vaccinations shall be offered to all individuals who are occupationally exposed to bloodborne pathogens. Vaccines shall be provided free of charge to employees who are subject to regulation by the Standard. Payment shall be made by the employee's department

For further information or copies of the FIU Exposure Control Plan, please contact the Department of Environmental Health & Safety at 348-2621.

# **USCG 102 - SAFE USE AND STORAGE OF COMPRESSED GAS CYLINDERS\***

**Last Update: 06/26/02**

## **PURPOSE**

To establish a standard for the safe use and storage of compressed gas cylinders.

## **GUIDELINES**

To implement safety guidelines for the safe use and storage of compressed gas cylinders and to ensure the safe handling and storage of compressed gas cylinders at the University premises.

### **1. General Use of Gas Cylinders**

- a. Know the contents of a cylinder and be familiar with the properties of that gas.
- b. Never use a cylinder that cannot be positively identified. Do not depend on color coding for gas identification.
- c. All cylinders must bear an identification tag stating the name of the gas or mixture and illustrating one of three conditions: full, in service, or empty.
- d. Handle cylinders carefully and fasten them in a secure manner at all times, in an upright position.
- e. Transport larger cylinders only on a wheeled cart specifically designed for gas cylinders. This applies to all cylinders of size 2 or larger. Remove regulators and attach safety caps before transport.
- f. Never tamper with any part of a valve, such as the safety or packing nuts.
- g. Do not strike an electric arc on cylinders.
- h. Use cylinders only with matched connectors and proper Compressed Gas Association regulators. Never install cylinder adaptors on a regulator. A regulator registration and periodic inspection program should be initiated by the gas users.
- i. Leak test all connections to a cylinder with a soap solution. Caution: Any gas, regardless of its health hazard, may cause asphyxiation by displacing oxygen.
- j. Close cylinder valves when not in use, then bleed pressure from the regulator.
- k. Close valves on empty cylinders and mark "empty."
- l. Never attempt to refill a cylinder.

This guideline adopts as recommended practice all applicable National Fire Protection Association (NFPA) codes when applied to the design and construction of all new facilities where compressed gas cylinders will be used and stored.

- m. Cylinders of compressed gases must be handled as high energy sources and therefore as potential explosives.
- n. When storing or moving a cylinder, have the cap in place to protect the valve stem.
- o. Do not expose cylinders to temperatures higher than 50° C (122° F).
- p. When classifying a gas mixture for use in the laboratory, base the classification on the most hazardous component.
- q. Never bleed a cylinder completely empty. Leave a slight pressure to keep contaminants out. Notify the vendor with a note if draw down occurs.
- r. Always wear safety glasses when handling and using compressed gases.

- s. Ground all cylinders containing flammable gases.
- t. When using gases with cryogenic properties, allow adequate ventilation and wear personal protection equipment including heavy gloves and safety goggles. (Gloves must be loose fitting to facilitate rapid removal in case of a spill).
- u. The number of cylinders of flammable gases and oxygen is limited to a maximum of three per laboratory (refer to appendix).
- v. Cylinders which are not necessary for current operations shall be stored safely outside the laboratory.
- w. Cylinders of all gases having a health hazard rating of 3 or 4 and cylinders of gases having a health hazard rating of 2 with no physiological warning properties shall be kept in a continuously mechanically ventilated enclosure. There will be no more than three cylinders of these hazard ratings per hood or other continuously mechanically ventilated enclosure per laboratory (refer to Laboratory Safety Manual).
- x. When transporting cylinders on elevators, passengers should be prohibited from entering until the cylinders have been unloaded at their destination. Signs should accompany the cylinder-in-transit warning passengers not to enter.

## **2. Storage of Gas Cylinders**

- a. Store cylinders in a ventilated area away from heat or ignition sources.
- b. Fasten cylinders securely at all times in an upright position.
- c. Cylinders in storage must be protected from weather extremes and direct sunlight. Protect the base of cylinders from dampness.
- d. Store flammable gases away from all other gases. This will be accomplished by a separation of at least 20 feet of open space or by a wall having a fire rating of at least one hour (refer to appendix).
- e. Safety caps shall be in place at all times during storage and transport of cylinders. Cylinders of all gases having a health hazard rating of 3 or 4 and cylinders of gases having a health hazard rating of 2 with no physiological warning properties shall be stored in a continuously mechanically ventilated enclosure if inside a building. If stored outside, the gases must be kept under lock and key and located away from populated areas and air intakes to buildings (refer to appendix).
- f. Cylinders will not be stored or left unattended in hallways, corridors, stairways, or other areas of access and/or egress.
- g. When classifying a gas mixture for storage, base the classification on the most hazardous component.
- h. Always separate empty and full cylinder storage.

## **3. Transportation (excluding in building transport)**

- a. Cylinders shall not be transported in a motor vehicle by University personnel on a routine basis. This transport should be handled by a licensed outside vendor.
- b. If transport by University personnel is absolutely necessary, contact the Department of Environmental Health and Safety at 348-2621 for approval prior to transport.

# **USCG 117 - TUBERCULOSIS CONTROL PLAN\***

**Last Update: 03/30/04**

## **PURPOSE**

The purpose of this guidance document regarding Tuberculosis is to:

1. Eliminate or minimize employee exposure to TB in the workplace
2. Comply with the CDC's guidelines
3. Establish a road map for response to suspect causes of tuberculosis in the work place.

## **SCOPE**

University-wide

## **OCCUPATIONAL EXPOSURE DETERMINATION**

The Occupational Health and Safety Administration (OSHA) requires employers to perform an exposure determination concerning which employees may experience occupational exposure to TB. The exposure determination is made without regard to the use of personal protective equipment (i.e. employees are considered to be exposed even if they wear personal protective equipment). The exposure determination includes all job classifications in which employees may experience occupational exposure, regardless of frequency.

In addition, the exposure determination must include a listing of job classifications in which employees may have occupational exposure. Since not all the employees in these categories would be expected to experience exposure to TB, task or procedures that would cause these employees to have occupational exposure must also be listed in order to clearly understand which employees in these categories are considered to have occupational exposure.

Job Classification

Task/Procedure

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## **IMPLEMENTATION SCHEDULE AND METHODOLOGY**

### **1. Compliance Methods**

Engineering and work practice controls must be used to eliminate or minimize student and employee exposure. Where occupational exposure remains after implementing these controls, personal protective equipment must be used. All engineering controls must be inspected and maintained on a regular schedule.

### **2. Testing**

Any individual who suspects that he or she has been exposed to TB should immediately visit their personal physician and notify their supervisor so that close personal contacts within the workplace can be notified.

A Mantoux skin test may be performed whenever exposure to an infectious tuberculosis case is suspected.

The FIU Health Care & Wellness Center shall administer this test for a fee, payable by the department requesting the test.

### **3. Mantoux Test Procedure**

The Mantoux test is performed by the intradermal injection of 0.1 ml of PPD tuberculin containing 5 TU (tuberculin units) into either of the forearm. This injection is made with a disposable tuberculin syringe. The injection is made just beneath the surface of the skin.

If the skin test is positive, the employee will be referred to a physician and be required to obtain an x-ray.

If the chest x-ray is suggestive of active tuberculosis, the employee will be placed on leave until subsequent testing shows that the employee is not infectious as verified by the employee's personal physician. A medical release to return to work will be required

### **4. Classification of the tuberculin reaction**

A tuberculin reaction of 10 mm or more is classified as positive in persons.

### **5. Respiratory Protection**

The Center for Disease Control Guidelines recommend and OSHA requires employees to wear a High Efficiency Particulate Respirator (HEPA) in the following circumstances:

- When employees enter rooms occupied by individuals who are suspected to be infected with, or confirmed to be infected with tuberculosis.
- When employees perform high hazard procedures on individuals who are suspected to be infected with, or confirmed to be infected with tuberculosis. Examples of high hazard procedures include:
  - Aerosolized medication (e.g. pentamidine) treatment
  - Bronchoscopy
  - Sputum induction
  - Endotracheal intubation and suctioning procedures

For further information please contact the Department of Environmental Health & Safety, Insurance & Emergency Management Services at 348-2621, or visit the Center for Disease Control Website at <http://www.cdc.gov/nchstp/tb/>

## **USCG 601 – LABORATORY GLASSWARE DISPOSAL GUIDELINES**

**Last Update: 06/01/01**

### **PURPOSE**

To provide a standard procedure for proper disposal of laboratory glassware

### **GUIDELINES**

- Broken laboratory glassware must be fully decontaminated, thoroughly rinsed and air dried before being placed in broken glass containers. Extreme care must be exercised when handling broken glassware. Always wear necessary personal protection.
- Laboratory glassware must be allowed to air dry before being placed in broken glass containers. Cardboard containers will not hold its integrity when wet.
- Disposal responsibilities remain with the generator of broken glassware. It is the generator's responsibility to remove the broken glass containers from the laboratory and placed them in the solid waste dumpsters located at the loading docks. Always wear eye protection while disposing of broken glassware containers.
- Broken glassware containers are not to be placed in hallways or means of egress. Broken glassware containers are to remain in the laboratory until the time of disposal. Custodial personnel will not remove nor dispose of broken glass containers.
- Broken glass containers are for the exclusive disposal of broken glassware. Do not mix broken glassware with laboratory equipment manufactured from any other material of construction.
- Unbroken glass containers must be fully decontaminated and thoroughly rinsed before being placed in the dumpsters. Do not place empty glass containers in hallways or means of egress. Exercise extreme caution when placing glass containers in metal dumpsters. Glass may cause injuries due to shattering at the time of contact with the hard metal surface. Always wear eye protection while placing glass containers in the dumpsters.

For more information regarding these guidelines, contact the Department of Environmental Health and Safety at (305) 348-2621.

## **USCG 602 – PURCHASE AND SAFE USE OF REFRIGERATION UNITS**

**Last Update: 06/01/01**

### **PURPOSE**

To outline the University's standard regulating the purchase and use of refrigeration units utilized in laboratory, research or other risk areas. The purchase of refrigeration units used exclusively for the refrigeration of items intended for human consumption are not included in this standard.

### **GUIDELINES**

#### **1. Definitions**

- a. Domestic Refrigeration Unit - Ordinary stock refrigeration equipment, such as refrigerators, freezers, ice machine, storage cases, coolers, etc.
- b. Laboratory - Safe Refrigeration Unit - A unit in which the refrigeration compartment(s) is vapor tight and excludes all lights, switches, heating units, thermostats, and other internal ignition sources.
- c. Explosion-Proof Refrigeration Unit - A unit which is designed for use within environments requiring control of all ignition sources, both internal and external.
- d. Flammable Liquid - Any liquid having a flash point below 100 F. (37.8 C) and having a vapor pressure not exceeding 40 pounds per square inch absolute (2068.6 mm Hg) at 100 F. (37.8 C).
- e. Combustible Liquid - Any liquid having a flash point at or above 100 F. (37.8 C).

#### **2. Purchase**

The department shall consult with the Environmental Health and Safety Laboratory Safety Compliance Officer regarding refrigeration equipment to be used in laboratory settings.

All refrigeration units obtained by means other than through the University Purchasing Department shall meet the minimum the laboratory-safe classification when the unit is intended for the refrigeration of any flammable or combustible liquid.

#### **3. Use**

- a. Items intended for human consumption shall not be placed in any refrigeration unit that is used, or has been used, for the refrigeration of any chemical included in the NIOSH Registry of Toxic Effects of Chemical Substances, radioactive material, etiological agents, carcinogens, drugs, other hazardous or toxic substances, or any other item not intended for human consumption.
- b. All refrigeration units that fall within this standard shall be permanently placarded on door with red lettering at least 1/2 inch in height, "storage of items for human consumption strictly prohibited."
- c. Each container placed in any refrigeration unit shall be dated and labeled to indicate hazard class and contents.
- d. Refrigeration units used for the refrigeration of items intended for human consumption shall not be located in laboratory areas.

## **USCG 603 – LABORATORY HOOD VENTILATION STANDARDS**

**Last Update: 06/01/02**

### **PURPOSE**

To establish general safety guidelines for the operation and maintenance of laboratory fume hoods.

### **SCOPE**

All laboratory fume hoods

### **GUIDELINES**

- Exhaust stacks should extend at least seven feet above the adjacent roofline.
- Laboratories should be maintained at an air pressure that is negative with respect to the corridors or adjacent non-lab areas.
- Controls and dampers should be designed so that if a failure occurs, they will open to assure continuous draft.
- Selection and placement of air supply diffusion devices should be made to avoid all currents that would adversely affect the performance of lab hoods.
- Automatic fire dampers should not be used in lab exhaust systems. Fire detection and alarm systems should not be interlocked to shut down lab hood exhaust fans automatically.
- Airflow indicators should be installed on new lab hoods or on existing lab hoods when modified.
- A second means of access to an exit should be provided from a lab work area if a hood is located adjacent to the primary means of exit access. For new installations, lab hoods should not be located adjacent to a single means of access to an exit or to high traffic areas.
- Air exhausted from lab hoods or other special local exhaust systems should not be re-circulated. Laboratory work areas should be under negative pressure to surrounding rooms and corridors.
- Separate hoods should be provided and labeled, "For Perchloric Acid Use Only." Hoods and duct work should be acid resistant, non-reactive and impervious to perchloric acid (for example, stainless steel). Fans should be acid resistant and non-sparking.
- Fans and drive belts should not be located in the air stream.
- Ductwork from fume hoods should take the shortest and straightest route to the outside and should not be combined with other exhaust systems.
- Horizontal duct runs should be as short as possible, with no sharp drainage.
- Water spray systems should be provided to wash the hood and the entire duct system.
- Sealants, gaskets and lubricants should be acid resistant and non-reactive with perchloric acid (for example, fluorocarbon grease).
- Lab hoods and duct work should be inspected at least annually.
- Hood tests should include face velocity and flow direction determinations.
- Alarms, flow detectors, fans, motors and other drive components should be inspected at least annually.

No hoods or other system components should be inspected, cleaned or repaired until tests have been made for explosive perchlorates if the system has been exposed to perchloric acid heated above ambient temperatures.

For more information regarding these guidelines, contact the Department of Environmental Health and Safety (305) 348-2621.

## **USCG 604 – RESEARCH ANIMAL CARE & WELFARE**

**Last Update: 10/15/03**

### **PURPOSE**

To establish the basic criteria for the care and maintenance of research animals.

### **SCOPE**

All laboratory based activities carried on University premises or in association with the University as primary or co-sponsor or researcher.

### **GUIDELINES**

#### **1. Basic Criteria**

- **Housing**: Animals must be housed in a structurally sound facilities, in good repair. The facility must contain the animals and protect them from other animals and extreme weather and temperatures. Drainage systems must also be in good repair.
- **Ventilation**: Animals must be provided with cool air or increased ventilation if the ambient temperature is above 85o F or heat if the temperature falls below 45o F.
- **Lighting**: Facilities must be lit well enough to allow safe and easy access for feeding, cleaning, and complete inspection.
- **Interior Surfaces**: The interior of a facility must be substantially impervious to moisture and allow for easy cleaning and sanitizing.
- **Primary Enclosures**: Animals must be housed in structurally sound enclosures that are in good repair, and meet Animal and Plant Health Inspections Services (APHIS) minimum space requirements. The floors must protect the animals from injury. The cages must be dry and clean and allow animals easy access to food and water.
- **Sanitation**: Animal waste must be removed and disposed of regularly and as necessary. Primary cages or enclosures should be sanitized at least once every 2 weeks. Facilities must not allow trash to accumulate.
- **Pest Control**: Facility managers must have an effective program to control insects, ectoparasites, and avian and mammalian pests.
- **Feeding and Watering**: Animals must be provided with nutritious, palatable food that is free from contamination, properly stored, and served in a clean receptacle. Potable water must be made available twice daily for 1 hour if it is not available all the time.
- **Outdoor Shelter**: Animals must be protected from extremes in sunlight, precipitation, and temperatures.
- **Compatibility**: Female animals in heat must be separated from male animals, except for breeding purposes. Animals with vicious dispositions should be housed apart from other animals. Puppies and kittens should be separated from adult animals other than their mothers. Different species of animals should not be housed together unless compatible.
- **Recordkeeping**: Laboratory Managers / Principal Investigators must maintain accurate and complete records of the sources of all animals that come into their possession. Laboratory Managers are also required to keep records of the dates of acquisition and disposition and to properly identify the animals on the premises. These records must be made available for inspection to the department of Environmental Health & Safety whenever necessary.

- Adequate Veterinary Care: Programs of disease control and prevention, euthanasia, and veterinary care must be established and maintained under the supervision and assistance of a veterinarian. A caretaker also must observe the animals daily.
- Handling: Animals must be handled properly at all times and all University personnel assigned or engaged to perform these duties must be appropriately trained and documentation maintained on file for review.
- Transportation: Animals must be provided with adequate space, ventilation during transportation. Most animals should not be transported until they have been weaned and are at least 8 weeks old.

## **2. Inspection Procedures**

The Department of Environmental Health & Safety will conduct bi-annual inspections to assure minimum compliance with the Animal Welfare Act requirements. The EH&S inspector will, upon discussion with the PI or Laboratory Manager agree upon a reasonable and achievable deadline for correcting these deficiencies. The inspector will re-inspect the facility at the expiration of this time frame. If the deficiencies have not been corrected, a new report and a copy of the prior inspection report will be forwarded to the University Compliance Officer, within the Division of Sponsored Research & Training.

For more information regarding these guidelines, contact the Department of Environmental Health and Safety (305) 348-2621.

# USCG 605 – CONTROL MEASURES FOR CHEMICAL USE

Last Update: 02/07/06

## **PURPOSE**

To establish a control for chemical use in all laboratories, stockrooms and other applicable locations on campus.

## **SCOPE**

University-wide.

## **GUIDELINES**

### **1. Hazard Potential**

- A. Hazard Review - A Hazard Review must be conducted to determine the hazard potential of the operation. The hazard potential of an operation will determine the type of control measures that must be used to protect the safety and health of the laboratory users.

### **2. Types of Control Measures**

- A. Engineering controls, such as local exhaust ventilation, reduce or eliminate exposures by modifying the source or reducing the quantity of contaminants released into the air.
- B. Administrative controls include job rotation, work assignment or time periods away from the contaminant, and performing hazardous operations in a safe manner.
- C. Personal protective equipment (PPE) includes respirators, gloves, eye protection, and other protective equipment. PPE is used after engineering and administrative controls have reduced, but not eliminated, the hazards.

### **3. Low Hazard Operations**

Low hazard operations include work with chemicals that are relatively harmless to slightly toxic, have no potential for uncontrolled process hazards, and staff have previous experience with the type of work. Low hazard operations require a Clearance Check prior to beginning work.

- A. Observe Standard Laboratory Practices when conducting a low hazard operation:
  - i. Never store food or beverages in storage areas, refrigerators, glassware, or utensils that are also used for laboratory operations.
  - ii. Do not eat, drink, smoke, chew gum, take medicine, or apply cosmetics in laboratories where chemicals or other hazardous materials (e.g., radioactive or biohazardous materials) are present.
  - iii. **Mouth pipetting of pipettes is strictly prohibited.** Always use a pipette bulb or other mechanical pipette filling device.
  - iv. Wash areas of exposed skin well before leaving the laboratory.
  - v. Remove contaminated personal protective equipment (e.g., lab coats) before leaving the laboratory.
- B. Wear Appropriate Personal Apparel
  - i. Confine long hair and loose clothing. Wear shoes at all times in the laboratory. Open-toe sandals and other perforated shoes are not permitted.

- ii. It is required to wear long-sleeved and longlegs clothing and a lab coat.
- iii. Jewelry should not be worn that interferes with gloves and other protective clothing or that could come into contact with electrical sources or react with chemicals.

C. Proper Equipment Use

- i. Use equipment only for its intended purpose.
- ii. Inspect equipment or laboratory apparatus for damage before use. Never use damaged equipment such as cracked glassware or equipment with frayed electrical wiring.
- iii. Shield or wrap Dewar flasks and other evacuated glassware to contain chemicals and glass fragments should explosion occur.

D. Transport of Chemicals

The following guidelines will be used when transporting all chemicals within facilities or from building to building. Transportation of chemicals on public ways is not permitted without proper licensing and properly placarded vehicles.

- i. Hand carried chemicals should be placed in a secondary container or acid carrying bucket with tight fitting covers and shock absorbing material to protect against breakage. Bottles should be protected from falling or tipping with a Speedi-Dry or similar means.
- ii. Wheeled carts used to transport chemicals should be stable and move smoothly over uneven surfaces without tipping or stopping suddenly, and should have lipped surfaces that would contain the chemicals if the containers break.
- iii. Laboratory employees transporting chemicals must wear splash goggles and a lab coat or apron in case containers break or chemicals are splashed.
- iv. Use freight elevators when available. Passenger elevators should be used only during low-use time periods and only by those who are handling the chemicals. All chemicals should be placed in a secondary container or acid carrying bucket with tight fitting covers and shock absorbing material to protect against breakage.
- v. Compressed gas cylinders should be transported with hand trucks only with the cylinder strapped in place. Cylinders should NEVER be dragged. Keep the cylinder capped until it is used.

E. Housekeeping

- i. All work areas, including work benches and floors must be kept clean, dry, and uncluttered.
- ii. Access to emergency equipment, electrical panels, emergency shutoffs (i.e. gas), fire extinguishers, utility controls, showers, eyewash stations, and laboratory exits must never be blocked. Three square feet is required around each.

F. Toxic Discharges and Waste Disposal

- i. Deposit chemical wastes in their appropriate, labeled receptacles and follow all other disposal procedures described in the FIU Lab Safety/Chemical Hygiene Plan.
- ii. Be particularly careful not to release hazardous substances into designated cold or warm rooms, since these facilities have constantly circulating atmospheres.
- iii. Minimize the release of toxic vapors into the laboratory by venting apparatus such as vacuum pumps and distillation columns into local exhaust devices. When especially toxic or corrosive vapors are involved, they should pass through scrubbers prior to being discharged from the local exhaust system. When not utilizing the exhaust hoods, cover sash to a point 6" above work surface to keep the room under negative

pressure. Windows and doors to the laboratory should be kept closed when hoods are open to maximize the air flow from the room.

G. Working Alone, After Hours

Employees should avoid working alone, if possible, when conducting research and experiments involving hazardous substances.

- i. Undergraduate teaching laboratories: A college representative trained in chemical safety must be present in the laboratory at all times when undergraduate students are conducting experiments.
- ii. Honor Students: Honor students who have a need to work alone must receive permission from their advisor prior to working alone.
- iii. Research Laboratories: Personnel who have a need to work alone must receive permission from their advisor prior to working alone.

4. **Medium Hazard Operations**

Medium Hazard Description:

Medium hazard operations include work with chemicals that are identified as:

- Allergen
- Cause burns
- Corrosive
- Flammable
- Heavy Metal
- Lachrymator
- Neurotoxin
- Oxidizer
- Peroxide or Peroxide forming
- Reactive
- Sensitizer
- Toxic
- Unstable
- Water Reactive

A. Observe the following Laboratory Practices in addition to Standard Laboratory Practices for work with medium hazard operations.

- i. Never store food or beverages in storage areas, refrigerators, glassware, or utensils that are also used for laboratory operations.
- ii. Do not eat, drink, smoke, chew gum, take medicine, or apply cosmetics in laboratories where chemicals or other hazardous materials (e.g., radioactive or biohazards materials) are present.
- iii. **Mouth piping of pipettes is strictly prohibited.** Always use a pipette bulb or other mechanical pipette filling device.
- iv. Wash areas of exposed skin well before leaving the laboratory.
- v. Remove contaminated personal protective equipment (e.g., lab coats) before leaving the laboratory.

B. Wear Appropriate Personal Apparel

- i. Confine long hair and loose clothing. Wear shoes at all times in the laboratory. Open toe sandals and other perforated shoes are not permitted.

- ii. It is recommended to wear long-sleeved and long legged clothing and a lab coat. Jewelry should not be worn that interferes with gloves and other protective clothing or that could come into contact with electrical sources or react with chemicals.

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Employees should avoid working alone, if possible, when conducting research and experiments involving hazardous substances.

- i. Undergraduate teaching laboratories: A college representative trained in chemical safety must be present in the laboratory at all times when undergraduate students are conducting experiments.
- ii. Honor Students: Honor students who have a need to work alone must receive permission from their advisor prior to working alone. If the student has approval from their advisor to work alone after normal working hours, they should contact the Department of Environmental Health and Safety (ext. 2621) and the Department of Public Safety (ext. 2626) to make them aware of their presence in the facility. The Department of Public Safety may make periodic checks of any laboratory having lone workers. Students working alone should plan a route of escape in case of an emergency. Students working alone should also notify a responsible person about their location and anticipated time of arrival at home or elsewhere. Those persons should be asked to contact the Department of Public Safety at 348-2626 within a reasonable time after which the person does not return.
- iii. Research Laboratories: Personnel with special need to work alone after hours should contact the Department of Environmental Health and Safety (ext. 2621) and the Department of Public Safety (ext. 2626) to make them aware of their presence in the facility. The Department of Public Safety may make periodic checks of any laboratory having lone workers. Laboratory personnel should plan a route of escape in case of an emergency. Personnel working alone should also notify a responsible person about their location and anticipated time of arrival at home or elsewhere. Those persons should be asked to contact the Department of Public Safety at 348-2626 within a reasonable time after which the person did not return.

H. Unattended Operations

- i. All chemical containers, including reaction vessels and process equipment, must be labeled.
- ii. An emergency phone number for the responsible person must be posted on the laboratory door.
- iii. A sign stating Let Run must be posted near the process.
- iv. The laboratory light must be kept on at all times for public safety and emergency personnel identification. If the door to the laboratory is not equipped with a visor panel, the door shall be left open for police inspection.
- v. Provide for the containment of toxic substances in the event of failure of a utility service, such as cooling water. Additional controls are needed for particularly hazardous chemicals.

I. Engineering Controls

- i. Use an appropriate laboratory hood if material is volatile or the process may produce aerosols.
- ii. Use appropriate storage containers for raw materials and waste materials (e.g., approved metal flammable safety cans and flammable storage cabinets).

J. Administrative Controls

- i. Have an appropriate Standard Operating Procedure (SOP) available for chemicals and procedures. Ensure that all laboratory users are familiar with SOPs.
- ii. Use appropriate hand protection and wash hands and any other potentially exposed skin immediately after working with chemicals.
- iii. Never eat, drink, smoke, chew gum, apply cosmetics, take medicine, or store food where chemicals are used.
- iv. Ensure all chemical containers are appropriately labeled.
- v. If possible, cover work surfaces with absorbent plastic backed paper to simplify clean-up of any spilled chemicals.
- vi. Have an appropriate waste disposal plan for waste chemicals.
- vii. Have an appropriate spill plan for chemicals.
- viii. If required by Hazard Review, conduct exposure monitoring and medical consultations.

K. Personal Protective Equipment

- i. Glove material must be compatible with chemical in use.
- ii. Laboratory coats with long sleeves should be worn buttoned (snaps are preferred).
- iii. Wear appropriate safety goggles when handling particularly hazardous chemicals. Safety glasses with side shields may not appropriate for protection with some chemicals.

## 5. High Hazard Operations

A. High hazard operations include work with particularly hazardous chemicals that are identified as:

- Carcinogens
- Reproductive Toxins
- Highly Toxic
- Extremely Toxic
- Fatal
- Poison
- Severe allergens
- Causes severe burns
- Explosive
- Pyrophoric
- Strong oxidizers
- Strong sensitizers

A. Observe the following Laboratory Practices in addition to Standard Laboratory Practices for work with high hazard operations.

- i. Never store food or beverages in storage areas, refrigerators, glassware, or utensils that are also used for laboratory operations.
- ii. Do not eat, drink, smoke, chew gum, take medicine, or apply cosmetics in laboratories where chemicals or other hazardous materials (e.g., radioactive or biohazardous materials) are present.
- iii. **Mouth pipetting of pipettes is strictly prohibited.** Always use a pipette bulb or other mechanical pipette filling device.
- iv. Wash areas of exposed skin well before leaving the laboratory.

- v. Remove contaminated personal protective equipment (e.g., lab coats) before leaving the laboratory.
- B. Wear Appropriate Personal Apparel
- i. Confine long hair and loose clothing. Wear shoes at all times in the laboratory. Open toe sandals and other perforated shoes are not permitted.
  - ii. It is recommended to wear long-sleeved and long legged clothing and a lab coat. Jewelry should not be worn that interferes with gloves and other protective clothing or that could come into contact with electrical sources or react with chemicals.
- C. Proper Equipment Use
- i. Use equipment only for its intended purpose.
  - ii. Inspect equipment or laboratory apparatus for damage before use. Never use damaged equipment such as cracked glassware or equipment with frayed electrical wiring.
  - iii. Shield or wrap Dewar flasks and other evacuated glassware to contain chemicals and glass fragments should explosion occur.
- D. Transport of Chemicals
- The following guidelines will be used when transporting all chemicals within facilities or from building to building. Transportation of chemicals on public ways is not permitted without proper licensing and proper vehicles.
- i. Hand carried chemicals should be placed in a secondary container or a carrying bucket with tight fitting covers and shock absorbing material to protect against breakage. Bottles should be protected from falling or tipping with a Speedi-Dry or similar means.
  - ii. Wheeled carts used to transport chemicals should be stable and move smoothly over uneven surfaces without tipping or stopping suddenly, and should have lipped surfaces that would contain the chemicals if the containers break.
  - iii. Laboratory employees transporting chemicals must wear splash goggles and a lab coat or apron in case containers break or chemicals are splashed.
  - iv. Use freight elevators when available. Passenger elevators should be used only during low-use time periods and only by those who are handling the chemicals. All chemicals should be placed in a secondary container or acid carrying bucket with tight fitting covers and shock absorbing material to protect against breakage
  - v. Compressed gas cylinders should be transported with hand trucks only with the cylinder strapped in place. Cylinders should NEVER be dragged. Keep the cylinder capped until it is used.
- E. Housekeeping
- i. All work areas, including work benches and floors must be kept clean, dry, and uncluttered.
  - ii. Access to emergency equipment, electrical panels, emergency shutoffs (i.e. gas), fire extinguishers, utility controls, showers, eyewash stations, and laboratory exits must never be blocked. Three square feet is required around each.
- F. Toxic Discharges and Waste Disposal
- i. Deposit chemical wastes in their appropriate, labeled receptacles and follow all other disposal procedures described in the FIU Lab Safety/Chemical Hygiene Plan.
  - ii. Be particularly careful not to release hazardous substances into designated cold or warm rooms, since these facilities have reticulated atmospheres.

- iii. Minimize the release of toxic vapors into the laboratory by venting apparatus such as vacuum pumps and distillation columns into local exhaust devices. When especially toxic or corrosive vapors are involved, they should pass through scrubbers prior to being discharged from the local exhaust system. When not utilizing the exhaust hoods, cover sash to a point 6" above work surface to keep the room under negative pressure. Windows and doors to the laboratory should be kept closed when hoods are open to maximize the air flow from the room.

G. Working Alone after Hours

Employees should avoid working alone, if possible, when conducting research and experiments involving hazardous substances.

- i. Undergraduate teaching laboratories: A college representative trained in chemical safety must be present in the laboratory at all times when undergraduate student are conducting experiments.
- ii. Honor Students: Honor students who have a need to work alone must receive permission from their advisor prior to working alone. If the student has approval from their advisor to work alone after normal working hours, they should contact the Department of Environmental Health and Safety (ext. 2621) and the Department of Public Safety (ext. 2626) to make them aware of their presence in the facility. The Department of Public Safety may make periodic checks of any laboratory having lone workers. Students working alone should plan a route of escape in case of an emergency. Students working alone should also notify a responsible person about their location and anticipated time of arrival at home or elsewhere. Those persons should be asked to contact the Department of Public Safety at 348-2626 within a reasonable time after which the person does not return.
- iii. Research Laboratories: Personnel with special need to work alone after hours should contact the Department of Environmental Health and Safety (ext. 2621) and the Department of Public Safety (ext. 2626) to make them aware of their presence in the facility. The Department of Public Safety may make periodic checks of any laboratory having lone workers. Laboratory personnel should plan a route of escape in case of an emergency. Personnel working alone should also notify a responsible person about their location and anticipated time of arrival at home or elsewhere. Those persons should be asked to contact the Department of Public Safety 348-2626 within a reasonable time after which the person did not return.

H. Unattended Operations

- i. All chemical containers, including reaction vessels and process equipment, must be labeled.
- ii. An emergency phone number for the responsible person must be posted on the laboratory door.
- iii. A sign stating "Let Run" must be posted near the process.
- iv. The laboratory light must be kept on at all times for public safety and emergency personnel identification. If the door to the laboratory is not equipped with a visor panel, the door shall be left open for police inspection.
- v. Provide for the containment of toxic substances in the event of failure of a utility service, such as cooling water. Additional controls are needed for particularly hazardous chemicals.

I. Engineering Controls

- i. Use an appropriate laboratory hood if material is volatile or the process may produce aerosols.
  - ii. Use appropriate storage containers for raw materials and waste materials (e.g., approved metal flammable safety cans and flammable storage cabinets).
- J. Administrative Controls
- i. Have an appropriate Standard Operating Procedure (SOP) available for chemicals and procedures. Ensure that all laboratory users are familiar with SOPs.
  - ii. Use appropriate hand protection and wash hands and any other potentially exposed skin immediately after working with chemicals.
  - iii. Never eat, drink, smoke, chew gum, apply cosmetics, take medicine, or store food where chemicals are used.
  - iv. Ensure all chemical containers are appropriately labeled.
  - v. If possible, cover work surfaces with absorbent plastic backed paper to simplify clean-up of any spilled chemicals.
  - vi. Have an appropriate waste disposal plan for waste chemicals.
  - vii. Have an appropriate spill plan for chemicals.
  - viii. If required by Hazard Review, conduct exposure monitoring and medical consultations.
- K. Personal Protective Equipment
- i. Glove material must be compatible with chemical in use.
  - ii. Laboratory coats with long sleeves should be worn buttoned (snaps are preferred).
  - iii. Wear appropriate safety goggles when handling particularly hazardous chemicals. Safety glasses with side shields may not appropriate for protection with some chemicals.

For more information regarding these guidelines, contact the Department of Environmental Health and Safety (305) 348-2621.

## **USCG 606 – CHEMICAL STOCKROOM MAINTENANCE AND STORAGE**

**Last Update: 02/07/06**

### **PURPOSE**

To set safety standards for the maintenance and chemical storage of chemical stockrooms.

### **SCOPE**

The premise is that in order to utilize natural resources in an environmentally compatible way, and to protect and enhance the environment, it is necessary to explore how our operations and research activities will affect the environment. The intended outcome of such disclosure is to generate conscious environmental decision-making, and should be undertaken for reasons other than mere regulatory and legal compliance.

### **GUIDELINES**

#### **Chemical Stockrooms**

Stockrooms are areas in facilities in which relatively large quantities of chemicals are stored for laboratory use.

#### **1. General Requirements for All Stockrooms**

- A. Stockroom access must be strictly limited to authorized personnel. All laboratories, preparation rooms, and storeroom/stockrooms must be locked and secured when designated laboratory employees are not present.
- B. A mechanical exhaust ventilation system must be in place and must provide at least 6 air changes per hour. Additional local exhaust may be required if activities such as dispensing take place in the storage area.
- C. Each storage area must have at least one large sink, safety shower, eyewash station, and appropriate fire extinguisher with adequate extinguishing capacity. Emergency equipment should be located next to the exit door and also within 25 feet of a hazardous area. Emergency equipment cannot be obstructed.
- D. For new facilities, each chemical storage area must have a master control shutoff valve for water, electricity, and gas.
- E. Shelving must be secure and well-braced. The weight limit provided by the manufacturer of the shelving unit must not be exceeded. Other shelving characteristics should include:
  - i. Anti-roll lips on all shelves to prevent containers from falling off shelves. Existing shelving otherwise suitable for storage use should not be replaced. New shelving should have anti-roll lips.
  - ii. Metal shelves should be corrosion-resistant.
  - iii. Aisles at least 3 feet between standing shelving
- F. All chemical storerooms and stockrooms must have clearly marked, unobstructed exits.
- G. Chemical stockrooms must be well-lit so that labels can be easily read.
- H. No aisle is permitted to dead end. Aisles must be kept clear of clutter. Material can not be stored in a means of egress.
- I. The environment in stockrooms must be controlled to avoid extremes of temperature and high humidity. Open flames, smoking, humidifiers, and heating units such as space heaters, hot plates and coffee makers are not permitted.

- J. Floors must be kept clean and dry. If being cleaned or when a spill has occurred, signs should be posted to warn of hazard.
- K. Wherever toxic chemicals are stored and could be released, self-contained escape respirators or self-contained breathing apparatus must be made available. If all parties have not been trained and fit-tested, they should evacuate in the case of an emergency.

2. Flammable Materials Stockrooms

Flammable materials not currently in use should be isolated in stockrooms. Storage facilities for flammables must meet the following specifications:

- A. The walls, ceilings, and floors of an inside storage room for flammable materials must be constructed of materials having at least a two-hour fire resistance, with the exception of buildings fully equipped with sprinkler systems.
- B. All doors between the rooms and the corridors should be self-closing. Smoke activated doors can remain open on magnets, but will close fully when fire alarm sounds.
- C. Adequate mechanical ventilation must be provided and controlled from a switch outside the stockroom door. Ventilation should be at floor level since flammable vapors tend to sink.
- D. In areas where Class I flammable liquids are stored or dispensed, electrical power, lights, switches, and sockets must be explosion-proof.
- E. Fan motors and ventilation equipment motors must be non-sparking.
- F. All smoking and lighting of matches are prohibited.
- G. An inside storage room meeting all the above specifications and not exceeding 150 square feet in floor area is permitted to contain no more than 2 gallons of flammables per square foot of floor area. Five gallons per square foot are allowed if in addition the room has an automatic sprinkler system.
- H. Chemical storage must meet applicable local building and fire codes.

**Chemical Storage Outside Stockrooms**

The nature of laboratory work calls for a certain amount of chemicals to be on hand for easy access. However, all laboratory employees must limit, as much as possible, the amounts of chemicals stored on bench tops, in hoods under sinks or other exposed areas. When these chemicals are flammable, combustible, reactive, toxic, or corrosive, the following rules will be observed.

1. Flammables and Combustibles

Legal limits on amounts of flammable, combustible, reactive, and unstable chemicals in laboratories will be determined and observed for each laboratory.

A. Flammable Liquids Storage Cabinets

- i. Flammable materials must be stored in cabinets that meet OSHA and National Fire Protection Association specifications that cabinet contents be protected from temperatures exceeding 325F for at least 10 minutes, enough time for personnel to evacuate the area.
- ii. Quantities of flammables stored should not exceed the manufacturer's specification for the cabinet.

B. Maximum Container Sizes

OSHA and NFPA limit the size of the container for classes of flammable and combustible materials. The more fire-resistant container, the larger it may be. Only certified containers will be used.

### C. Safety Cans for Flammables

Approved portable safety containers should be used for storing flammable liquids. Flammable liquids in quantities greater than 4 liters (1 gallon) will be flammable and other compressed gases.

- i. The names of compressed gases must be prominently posted.
- ii. Storage of flammable gases in laboratories is not permitted, except when being used. No more than twice the procedures requirements will be present in the laboratory.
- iii. Flammable gas cylinders should be stored in a separate area from other types of compressed gases.
- iv. If gases are transferred through a manifold or pipe to or from equipment, the connections piping and/or tubing should be compatible with the gases used (i.e. copper and acetylene are incompatible).
- v. Cylinders of incompatible gases must be segregated by distance. Cylinders must be grouped by the type of gas (e.g. toxic, corrosive, etc.)
- vi. Empty cylinders should be separated from nonempty cylinders and labeled "empty" or "EMT".
- vii. All compressed gases must be stored away from direct or localized heat (including radiators, steam pipes, or boilers) in well-ventilated and dry areas and away from areas where heavy items may strike them (e.g., near elevators or service corridors).
- viii. All compressed gases, including empty cylinders, must be secured in an upright position with chains, straps or special stands of adequate strength and must be capped when stored or moved.
- ix. A hand truck must be available for transporting gas cylinders to and from storage areas.

## 2. **Oxidizers**

Oxidizers must be stored away from incompatible materials such as:

- Flammables and combustible materials
  - Greases
  - Paper trash binds
  - Finely divided metals
  - Organic liquids
  - Other oxidizers
- A. Nitric acid, sulfuric acid, and perchloric acid should be stored separately from organic acids in rooms, cabinets, or break-resistant containers and placed in acidic-resistant trays.
  - B. Strong oxidizing agents should be stored and used in glass or other inert containers. Corks and rubber stoppers should not be used. High energy oxidizers should be segregated.
  - C. Peroxides and chemicals that tend to form peroxides must be stored in airtight containers in a dark, cool and dry place.  
To minimize the rate of decomposition, peroxides and peroxidizable materials should be stored at the lowest possible temperature consistent with their solubility and freezing point. Liquid peroxide or solutions should not be stored at or below the temperature at which the peroxide freezes or precipitates, because peroxides in these forms are extremely sensitive to shock and heat.

**3. Toxic Chemicals**

- A. Extremely toxic substances must be stored in unbreakable chemically resistant secondary containers.
- B. Adequate ventilation must be provided in storage areas especially for toxic chemicals that have a high vapor pressure.
- C. All dispensing of these materials must be conducted in a fume hood.

For more information regarding this guideline, contact the Department of Environmental Health and Safety at (305) 348-2621.

## **USCG 607 – CHEMICAL SPILL CLEANUP AND REPORTING**

**Last Update: 02/07/06**

### **PURPOSE**

To set safety standards for the cleanup and reporting of chemical spills.

### **SCOPE**

University-wide.

### **GUIDELINES**

#### **Incidental Chemical Spills**

Incidental spills are defined as hazardous material releases in quantities that do not exceed the Reportable Quantity (RQ) per state law and which take place in an enclosed space. The guideline for this policy is 100 milliliters (mL) or less.

1. These spills can be cleaned up by trained laboratory personnel.

If no person has been contaminated by the spill and the spill is localized, do the following:

- A. Do not re-enter the laboratory alone. Use proper personnel protection equipment (PPE) such as gloves, eye protection, and body protection, e.g., lab coat.
- B. Notify all other personnel in the affected room to evacuate including yourself. Have someone notify the laboratory supervisor or Principal Investigator. Keep other people out of the laboratory.
- C. Determine if the spill can be cleaned up by using spill pillows, towels, sand, etc.
- D. Clean up the spill and place the spill clean up items into a labeled hazardous waste container and place it into the Satellite Accumulation Area.
- E. Remove any contaminated PPE and immediately wash hands, etc. Dispose of the contaminated PPE as any contaminated item used in the spill clean up has been handled.
- F. The incident should be reported to the Environmental Compliance Officer at Environmental Health & Safety by the person responsible for the room, laboratory, etc.

If any person has been contaminated by the spill, especially eyes and skin, take immediate responsive actions using the eye wash, safety shower and appropriate first aid techniques. Please notify Public Safety that personnel were exposed and request further assistance as needed.

- A. Notify all other personnel in the affected room to evacuate, exit the room and close the doors to the room.
- B. Assist the contaminated person(s) to a safe eyewash or drench shower station to wash the contamination away.
- C. Notify the Campus Police Department, ext. 2626. Give the name of the chemical and that a small spill has occurred. The Campus Police will notify the Department of Environmental Health & Safety at ext. 2621 or the Environmental Compliance Officer at ext. 6971.
- D. Ask the Campus Police for medical assistance for the person(s) affected by the spill.

If assistance and additional support is required from first responders:

- A. Remain at the door of the room to explain to the First Responders the quantity and location of the spill.
  - B. The First Responders should evaluate the spill quantity and location for feasibility of complete Remediation.
  - C. The First Responders should clean up the spill using approved spill clean up kits, personal protection equipment, etc.
  - D. The incident should be reported to the Department of Environmental Health & Safety by the person responsible for the room, laboratory, etc and the First Responders.
2. Handling of the Hazardous Waste
    - A. All items used in the spill clean up should be placed into a suitable container and labeled with the appropriate hazardous waste information.
    - B. The container should be placed into a Satellite Accumulation Area for safekeeping and handled in accordance with USCG 303 –Hazardous Waste Disposal.

### **Reportable Spills**

Incidental spills are defined as hazardous material releases in quantities that do not exceed the Reportable Quantity (RQ) per state law and which take place in an enclosed space. The guideline for this policy is 100 milliliters (mL) or greater.

1. Spill Response
  - A. Notify all other personnel in the affected room.
  - B. All personnel must exit the room and close the doors to the room.
  - C. Prevent others from entering the room.
  - D. Notify the Department of Public Safety at ext. 2626 that a large spill has occurred. Tell the Campus Police the name of the chemical spilled. The Campus Police will notify Facilities Management and the Department of Environmental Health and safety at ext. 2621, and emergency contact numbers on record.
  - E. Remain at a designated point to await arrival of the First Responder
2. Spill Remediation

As appropriate, upon notification, the department of Environmental Health & Safety will determine the need to activate the FIU EMCOP.
3. Handling of the Hazardous Waste

Handling of the hazardous waste should be accomplished in accordance with the Amherst College Emergency Contingency Plan and the Hazardous Waste Management Policy, 8.0.

For more information regarding this guideline, contact the Department of Environmental Health and Safety at (305) 348-2621.

## **USCG 608 – GLOVE BOX STANDARDS**

**Last Update: 02/07/06**

### **PURPOSE**

To establish safety standards for the safe use of glove boxes

### **SCOPE**

University-wide

### **GUIDELINES**

Glove boxes and glove bags are isolation units used for handling highly toxic chemicals and carcinogens. These units are negative pressure, so air leakage is into the unit. The ventilation rate must be at least volume changes per hour and pressure at least 0.5 inches of water.

1. Some units are positive pressure, so there is the potential for leakage into the laboratory.
2. Positive pressure units are used when protection from atmospheric moisture or oxygen is required.
  - A. **Never use toxic chemicals in a positive pressure unit.**
3. These units must be regularly tested for leaks and must have a shut-off valve and pressure gauge installed.
4. Exhaust air is treated by scrubbing and/or absorption prior to release into the regular exhaust system.
5. For further information on glove boxes, please consult the FIU Biosafety Officer at ext. 3387, or the laboratory safety manual at [http://www.fiu.edu/~ehs/chemical\\_safety/home\\_chemical.htm](http://www.fiu.edu/~ehs/chemical_safety/home_chemical.htm)

For more information regarding this guideline, contact the Department of Environmental Health and Safety at (305) 348-2621.