Southern Illinois University Carbondale

Chemical Hygiene Plan

Chemical Oversight Advisory Committee
Approved February 2019

Must be reviewed and updated annually by laboratory/studio personnel.

Date of Review: _____ Name of Reviewer: _____

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1. Introduction

The purpose of the Chemical Hygiene Plan is to establish policies and procedures regarding the use of hazardous chemicals in laboratories at Southern Illinois University. The Chemical Hygiene Plan, referred to as the Plan throughout this document, is required by the Occupational Safety Health Administration's (OSHA) 29 CFR 1910.1450, *Occupational Exposures to Hazardous Chemicals in Laboratories*.

Southern Illinois University Carbondale is committed to protecting the health and safety of laboratory workers and to provide workers with a safe and healthy laboratory environment.

2. Applicability of the Plan

The Plan is applicable to all people working with hazardous chemicals in laboratories at SIUC.

OSHA defines a hazardous chemical as "…a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principals that acute or chronic health effects may occur in exposed employees."

Additionally, OSHA defines a laboratory as "a workplace where relatively small quantities of hazardous chemicals are used on a nonproduction basis."

An employee is defined by OSHA as "an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his/her assignments." Employees in laboratories at SIUC include faculty members, civil service staff, administrative professional staff, graduate students and undergraduate students who work in a research laboratory or in a teaching laboratory. Students in academic laboratories are not considered laboratory employees.

Upon request, the Chemical Hygiene Officer will determine if a given laboratory or person is subject to the Plan.

3. Responsibilities of Personnel

University Chancellor

In compliance with the Standard, the chief executive officer of the Carbondale campus is responsible for implementation of the Plan and for the health and safety of laboratory employees. The University Chancellor has delegated the supervision of the program to the Director of the Center for Environmental Health and Safety (CEHS) and to the Chemical Oversight Advisory Committee.

Director of the Center for Environmental Health and Safety

The Director of CEHS is responsible for chemical hygiene within the institution, and will provide continuing support for efforts to improve chemical hygiene.

Chemical Oversight Advisory Committee

The Chemical Oversight Advisory Committee (the Committee) will be established and meet according to its operating paper.

The Committee will:

1. Appoint a Chemical Hygiene Officer (CHO) in conjunction with the Director of CEHS,
2. Review and update the Plan annually,
3. Address issues of health and safety in laboratories,
4. Review reports of laboratory accidents, and
5. Establish policies and procedures for work with hazardous chemicals in laboratories

Chemical Hygiene Officer

The CHO will be appointed by the Chemical Oversight Advisory Committee and the Director of CEHS. The CHO will be a person knowledgeable of, and experienced in, handling hazardous chemicals in laboratories.

The CHO will:

1. Provide technical expertise and assistance to the University laboratory community;
2. Advise laboratory supervisors regarding proper handling, storage and disposal of hazardous chemicals;
3. Review research protocols which include the use of hazardous chemicals to ensure that the proper procedures are utilized to protect laboratory workers' health and safety;
4. Assist laboratory supervisors with inspections as requested;
5. Review operation and maintenance of fume hoods, safety showers, biologic safety cabinets, and eyewash stations;
6. Maintain records of chemical accidents and incidents;
7. Assure compliance in hazardous chemical waste storage and disposal, and

8. Maintain a library of material safety data sheets and other laboratory safety literature.

Deans, Directors, Heads of Academic and Administrative Units

These officials have the primary responsibility for the safety of their faculty, staff and students. Specific responsibilities include:

1. Assist faculty and staff in the implementation of the Plan, and
2. Make budget arrangements for health and safety improvements.

Laboratory Supervisors

These include faculty and staff who oversee research and teaching laboratories. Their responsibilities include:

1. Train employees in laboratory-specific operating procedures and hazards, and maintain records of all employee training;
2. Implement and enforce rules concerning laboratory safety, including compliance with the Plan;
3. Make available and enforce the use of appropriate personal protective equipment;
4. Be aware of the chemicals stored and used in their laboratories and the associated hazards;
5. Conduct regular laboratory inspections, assisted by the CHO;
6. Report accidents to CEHS in a timely manner, and cooperate with any recommendations to prevent laboratory hazards;
7. Maintain an inventory of chemicals in their laboratory;
8. Conduct hazard assessment and employee exposure determination;
9. Request assistance from the CHO as necessary, and
10. Request allocation of funds for improvements of health and safety as needed.

Laboratory Employees

Responsibilities regarding implementation of the Plan are as follows:

1. Follow applicable rules and regulations, including the provisions of the Plan;
2. Report any hazardous conditions to laboratory supervisors;
3. Wear/use appropriate personal protective equipment;
4. Report any job-related injury or illness to laboratory supervisors;
5. Operate instrumentation or equipment only after instruction and authorization; and
6. Learn about the hazards of chemicals in the laboratory, and request information or training before dealing with hazardous chemicals or procedures;
7. Attend annual training sessions, and other training sessions as required by laboratory supervisors. Please refer to the Training Checklist for Laboratory and Non-Laboratory Facilities on the CEHS website to find the various trainings that CEHS has available: https://cehs.siu.edu/about/training/training-checklist.php

4. Standard Operating Procedures

4a) General Rules

Experiments should not be left unattended in the lab without permission from the laboratory supervisor. Working alone in the lab with hazardous materials is strongly discouraged.

Lab exits, aisles, and safety equipment should not be obstructed at any time. Do not block or lock secondary exits. No equipment should be stored on the floor in the aisles.

Eating, drinking, smoking, handling contact lenses, applying makeup and chewing gum are forbidden in laboratories which contain hazardous chemicals. Food cannot be stored in the lab. Refrigerators in the lab must be used only for storage of samples and reagents, or only for food items, and must be appropriately labeled.

Check glassware and equipment for damage before using. Pressurized or vacuum apparatus should be shielded.

Chemical waste is to be disposed in accordance with the Chemical Waste Management Guide. The Chemical Waste Management Guide is included in the Chemical and Biological Safety Manual; a copy of the manual should be kept in each laboratory. For chemical disposal issues not addressed in the Chemical Waste Management Guide, CEHS must be consulted prior to any disposal activity.

Pipetting by mouth is forbidden.

No **new** equipment, such as refrigerators, freezers, ultralows, flammables cabinets, incubators, or autoclaves, may be permanently installed or stored in any hallway. All equipment in hallways at present must have a sign identifying the lab to which it belongs. All equipment in the hallway must be locked at all times; it is not permissible to leave refrigerators or ultralows unlocked at any time. Do not unlock hallway equipment at the beginning of the day and leave it unlocked for the rest of the day. We strongly encourage researchers to move existing hallway equipment out of the hall and into a secure location.

4b) Personal Protective Equipment

Correct use of personal protective equipment and practice of good chemical hygiene can help minimize exposure to chemicals during lab work.

Clothing worn in the lab should completely cover feet, legs, trunk and upper arms**.** Lab coats must be worn by all lab occupants at all times. Lab coats must not be worn into clean areas, such as lunch rooms, lecture halls, restrooms, outdoors, and so on. Do not wear shorts, sandals or perforated shoes. Confine loose clothing and long hair.

The university has a contract for lab coat cleaning with a vendor, through Plant and Service Operations. Contact CEHS for details, or Educational Support

for the School of Medicine. Lab coats should never be taken home for laundering, and should never be taken to a commercial facility like a laundromat.

Disposable nitrile gloves are the usual appropriate glove for working with most chemicals in the lab. Nitrile gloves are more resistant to organic solvents, acids and bases than latex gloves. Additionally, latex is an allergen; effort should be taken to avoid routine exposure to latex. For special applications, such as extended immersion of gloved hands in corrosive or flammable liquids, manufacturers have published glove compatibility charts which should be consulted for glove material choice; the CHO can assist in choice of glove material. Disposable gloves must only be used once. Gloves should be removed before exiting the lab. Always wash your hands with soap and water after removing gloves.

All lab personnel must wear appropriate eye protection while in the lab. Eye protection should be chosen based on hazards identified, and includes safety glasses, goggles and face shields.

4c) General Chemical Handling and Storage

Chemicals must be stored separated by hazard category or by functional group. Recommended groups include:

Inorganic liquid acids
Organic liquid acids
Organic nonflammable solvents
Organic flammable solvents
Air and water reactives
Inorganic liquid bases
Organic liquid bases
Solid inorganics
Solid organics
Oxidizers
Oxidizing acids
Cyanide-bearing compounds

Store oxidizers and oxidizing acids away from organic compounds, since they are incompatible. Clearly mark air- and water-reactive storage areas, and keep them separate from other chemicals.

Liquids should be stored in secondary containment, such as a plastic bin or tub, large enough to completely contain the liquid in the case of catastrophic failure of the primary container.

Up to ten gallons of flammable solvents may be stored in the lab in glass or plastic containers. Amounts in excess of ten gallons must be stored in flame-proof containers or in a flammables cabinet. The ten gallon limit includes any flammable hazardous waste.

Flammable solvents which are refrigerated must only be kept in flammable refrigerators which will not spark in the interior of the cabinet.

Chemicals should not be stored in the fume hood; chemicals which emit odors or stenches should be kept in ventilated cabinets under the fume hood.

Chemicals should be stored in cabinets with doors, or on shelves in secondary containment, or on shelves with lips or other devices to prevent the bottles from falling. Chemicals should be stored at or below eye level.

Every container of chemicals, including beakers and wash bottles, must be labeled at all times with the full name of the chemical. Chemical structures, formulas or abbreviations are not acceptable. Unlabeled containers of chemicals are deemed to be uncharacterized hazardous waste. Very small containers, like microcentrifuge tubes, can be numbered or coded, but the key to the numbers or codes must be kept in the lab at all times. Solvents that can form explosive peroxides must be dated when opened.

An inventory of all chemicals in the lab must be kept in the lab and updated at least annually, and when new chemicals are added. Lab supervisors should carefully consider the utility, and risk, of keeping chemicals which are more than ten years old. These old chemicals are probably not suitable for research purposes, and should be disposed through CEHS.

The Globally Harmonized System, or GHS, became effective for OSHA's Hazard Communication Standard in 2011. Although no changes are required for Chemical Hygiene Plans, GHS mandates one or more of nine standard pictograms on hazardous chemical labels. The pictograms and a description of the hazards to which they apply are listed in Appendix F.

Standard operating procedures (SOPs) should be developed for all highly hazardous chemicals in each lab. SOP templates are available from the UCLA website.

4d) Compressed Gas Cylinder Handling and Storage

Cylinders must be secured at all times to the wall or benchtop with chain, rope or a belt to prevent them from falling. Cylinder support must encircle the tank more than half-way up the cylinder. Caps must be kept on all cylinders unless a regulator is attached to them. Regulators used must be appropriate for the gas type; regulators for flammable gases must have a flame arrestor or flashback device. Within the lab, cylinders may be moved by rolling them, but they must be strapped to a cart for movement down a hall or to a different floor.

Whenever possible, workers should purchase compressed gases through the approved vendor listed on the CEHS website. Users purchase the gases and pay a monthly rental fee for the tank. If a small lecture cylinder of gas is purchased from another company, the purchaser will be responsible for the fees associated with the return or disposal of the lecture cylinder.

4e) Ventilation Hoods

There are two primary types of ventilation hoods used in laboratories at SIUC; chemical fume hoods and biosafety cabinets. Chemical fume hoods should be used for corrosive and flammable chemicals, while biosafety cabinets are used for work with bacteria, viruses, cells and tissues. Perchloric acid must only be used in a hood designed specifically for that application, which includes mechanisms for flushing the hood, ductwork and ventilation fan. See the SOP for perchloric acid for more information.

Chemical fume hood systems include the fume hood chamber with a moveable sash, ductwork to the roof of the building, and an exhaust fan on the roof. The following factors must be considered when designing labs: placement of fume hoods in respect to traffic patterns and doorways; provision of make-up air to the hood; and selection of monitoring system. The following factors are controlled by the fume hood user: apparatus and reagents stored in the hood; height of the sash while working; proper work practices in the hood.

Chemical fume hoods will be surveyed annually to measure air flow at the face of the hood, and the results of the survey will be posted on the hood. The survey will be conducted with the sash opening set at 18”, and measurements will be taken at one foot intervals. The following classification system will be used:

Score	Criterion	Usage
Pass	80 – 120 fpm ave. face velocity	Normal chemical hood use
Restrict	70 – 79 fpm or 121 – 150 fpm ave. face velocity	Not recommended for use with highly toxic materials
Fail	Does not meet either standard	Storage only

Following are work practices to be followed when working in chemical fume hoods:

1. All work involving hazardous chemicals which may emit vapors or fumes should be performed in a chemical fume hood.
2. Before beginning work, check to make sure that the fan is turned on and that there is air flow at the face of the hood. This can be done by looking at the monitor, or by holding a tissue at the bottom edge of the sash to see if it is pulled into the hood.
3. The sash on the fume hood should be placed as low as is practical, but no higher than 18” above the benchtop. The sash will prevent vapor from moving into the breathing zone, and will afford splash and explosion protection.

4. Place reagents and apparatus at least 6” inside the edge of the hood to prevent vapors from migrating out of the hood.
5. Elevate large items off the benchtop of the hood to provide air movement under them to the baffle at the rear of the hood.
6. Do not extend face or head into the hood.
7. Do not use the hood for storage of chemicals. All items in the hood act to interfere with air patterns and reduce removal of vapors.
8. Electrical equipment used in the hood should be examined and placed so as to prevent sparks, which could result in a fire or explosion. Electrical connections should be made outside the hood.

Biosafety cabinets recirculate air and filter it through a series of filters to remove contaminant particulate matter. Biosafety cabinets will function to maintain a sterile environment inside the cabinet and in the lab. Since the filters can be damaged by corrosive or flammable vapors, these reagents should not be used in biosafety cabinets.

Biological safety cabinets will be surveyed annually and certified by an electrical firm licensed to certify them. If the cabinet fails certification it cannot be used until it has been brought back into operating parameters, including replacement of filters if necessary. Biosafety cabinets that were installed at the time the building was constructed are capitalized to the building, and the cost for certifying and maintaining these cabinets will revert to Physical Plant. Biosafety cabinets added after the building was constructed are the property of the department which purchased them, and the department will be charged for the annual certification and for any necessary remediation.

4f): Chemical Spills

Small chemical spills in the lab can usually be cleaned up by workers in the lab. Following are procedures to be used when cleaning up a general chemical spill:

1. Put on appropriate personal protective equipment, including gloves, lab coat or gown, and eye protection.
2. Place sorbent material on the spill. Sorbents must be compatible with the chemical hazard. Paper towels, vermiculite, kitty litter or sand can be used.
3. Sweep up the sorbent with the spilled material using a broom and dustpan. Place it in a plastic or glass container with a screw top, like a wide-mouth jar or a bucket with a lid.
4. Place a yellow “Hazardous Waste” label on the container and list the contents (e.g. “clean-up material from a spill of ethyl acetate”).
5. Follow the instructions for removal of hazardous chemical waste.

Call CEHS for assistance in cleaning chemical spills if the spill is greater than 20 liters; if the spill presents an immediate danger to health, such as a spill of mercury or a chemical that will emit hazardous vapors; or if there is a risk of

fire or explosion in the lab. In any of those instances, evacuate the lab and close the door. Pull the fire alarm to evacuate the building if necessary. *CEHS must always be consulted for a release of mercury, since this cleanup requires specialized equipment and disposal. See the following section marked "Mercury".*

4g) Controlled Substances

Certain chemicals are regulated under the State of Illinois Controlled Substances Act by the Illinois Department of Financial and Professional Regulation (IDFPR), and by the United States Drug Enforcement Administration (DEA). These chemicals include substances used for analgesia, anesthesia and euthanasia in animals. They are controlled due to their potential for abuse. Researchers who wish to work with these substances must first obtain a license from IDFPR, then use that license number to apply for a license from DEA, before they can obtain or use the substances.

CEHS will conduct the oversight for controlled substances. CEHS personnel will assist investigators in obtaining the necessary permits, keep a record of all permit numbers and expiration dates, and coordinate disposal of outdated drugs. CEHS also has the authority to conduct inspections of controlled substances storage and inventory.

Each investigator must obtain an individual permit, and must obtain a separate permit for each location where drugs will be stored. Controlled substances cannot be shared between investigators.

Instructions for Obtaining a State of Illinois Permit

This link will open the State of Illinois permit application:
https://www.idfpr.com/Renewals/apply/forms/f2249.pdf

The form must be filled out, printed and mailed to the address listed; applications are not yet accepted electronically.

Fill in "Southern Illinois University" in Box 5, and list the individual permittee name in Box 9, Designated Representative. Fill in other information as required.

Please note that in Box 17, you may enter information for one or two (not more than two) people who will be named as "Authorized Agents". These people must undergo a background check. The Principal Investigator and his/her Authorized Agent(s) are the only people who will have access to the safe in which the drugs are kept, and are the only people who may dispense drugs to other lab or field workers.

Fee for the State permit is $50 initially, paid by the lab requesting the permit, and renewal is free thereafter.

Note that the requirement for security of substances is generally two locks; that is, if the lab or office door is kept locked all the time, the substances can be stored in a safe or in a heavy-duty locked filing cabinet.

Please read the regulatory requirements for beginning inventory, semi-annual inventory, and closing inventory.

Principal Investigators must inform CEHS when they apply for a State controlled substances permit.

After the State issues the permit, the investigator can apply for a DEA permit.

Instructions for Obtaining a DEA Permit

This link will open the DEA permit application: https://apps.deadiversion.usdoj.gov/webforms/jsp/regapps/common/newAppLogin.jsp

You will need to complete Form 225 for Researcher, Schedules II – V. The form initially indicates a yearly fee of $244, but there is a place in the application to waive this fee for university research.

This form must be filled out and submitted electronically.

Before the DEA issues the permit, an agent will generally schedule a pre-permit inspection of the lab. They will read the research proposal, the list of Authorized Agents, ask questions about the procedures for the ordering and dispensing of drugs, insure that inventory forms are available, and inspect the area where the drugs will be stored and dispensed. Prior to the agent's visit, it is recommended that Principal Investigators read the applicable regulations pertaining to controlled substances storage, use and inventory.

After the DEA issues the permit, Principal Investigators may obtain Schedule II controlled substances using Form 222, ordering forms issued by the DEA. Drugs in Schedules III, IV and V can be ordered without using a Form 222.

When the DEA permit is issued, the Principal Investigator must inform CEHS.

Responsibilities

The Principal Investigator is responsible for correct and complete application for permits, and is responsible for the ordering, use, storage, inventory recordkeeping, and disposal of all controlled substances. The Principal Investigator is responsible for providing appropriate safe storage for controlled substances.

The Principal Investigator may name one or two people as Authorized Agents. To reduce the likelihood of diversion, no more than two people may be named as Authorized Agents for each permit. An Authorized Agent must be named on the permit applications and undergo a background check. Authorized Agents can oversee dispensing, handling and disposal in the absence of the Principal Investigator.

Other lab personnel may be named as Authorized Users. An authorized user may receive controlled substances from the Authorized Agent or the Principal Investigator on a daily basis. Authorized Users must return all unused drugs and appropriate records of dispensing at the end of each working day. They may not have access to the locked storage or inventory, and they may not order drugs.

Please note that all drugs must be returned to the secure storage location area named on the permit at the end of each working day, and the inventory must be updated.

4h) Disposal of Chemical Waste and Empty Chemical Containers

Each lab that produces chemical waste should establish a chemical waste satellite accumulation area. The area can be at any convenient place in the lab except on the floor. The area should be designated by hanging the “Chemical Waste Satellite Accumulation Area” poster and marking the area with label tape. Once each month, a worker in the lab must inspect the waste area and fill out, sign and date the monthly inspection form. The completed forms must be kept in the Chemical and Biological Safety Manual.

Chemical waste must be placed in bottles with screw lids and identified with a yellow “Hazardous Waste” label. Complete chemical names should be used to identify the contents; chemical formulas, structures or abbreviations are not acceptable. Waste may not be placed in open containers, like beakers. *Do not* identify the waste bottle by writing the word “waste” on tape or by marking through the original label and writing “waste” on the defaced label. Only one bottle is allowed for each waste stream; that is, when a bottle is full, before

beginning accumulation of the same kind of waste in a second bottle, lab workers must file a chemical pickup request with CEHS for removal of the full bottle. Lab workers should file a chemical waste pickup request with CEHS when one of the following occurs:

- A waste bottle is full
- Chemicals are identified as expired, or are no longer needed
- One quart of acute hazardous waste has accumulated
- 55 gallons of non-acute hazardous waste has accumulated
- When the research project is complete and the waste container is no longer needed.

Chemical waste pickup requests can be filed by clicking on the link and following the directions. The pickup request must include a list of all the solvents and solutes in the container, including percentages if appropriate. CEHS will remove the waste from the satellite accumulation area to the central accumulation facility within three days of the receipt of request. CEHS will pick up waste at no charge to the generator, with the exception of waste compressed gas lecture cylinders.

Empty chemical bottles may contain residues, and these residues may mix with incompatible materials in a dumpster or trash can, causing reactions or fires. Empty bottles should be triple-rinsed with a compatible solvent, and the rinsate should be collected for disposal as hazardous waste, unless it is nonhazardous and safe for sink disposal (see the Chemical Waste Management Guide for listing of nonhazardous chemicals). Remove the labels from the triple-rinsed bottles. They can then either be placed in a box for disposal in the dumpster, or call CEHS and we will collect them.

Chemical waste must be segregated, labeled, stored, and disposed according to guidelines in the Chemical Waste Management Guide, which is included in the Chemical and Biological Safety Manual. This guide is present in each laboratory, and is available on the CEHS website. CEHS can provide guidance and assistance in storing, handling, and disposing chemical waste.

4i) Mercaptans

Ethyl mercaptan is placed into natural gas to give it a characteristic warning odor. Laboratory work with mercaptans and mercaptan-related compounds give off odors similar to natural gas, and may cause other workers in the building to fear a gas leak. The department office and CEHS must be notified that a lab intends to use mercaptans before they are opened, in order to minimize false reports of gas leaks.

4j) Mercury

CEHS recommends that all mercury-containing devices in laboratories be replaced with suitable non-mercury devices.

Generally, spirit (alcohol) thermometers, thermocouples, or digital thermometers are available for use in lieu of mercury thermometers.

Mercury, when spilled, emits a colorless, odorless gas for months or years following the spill. Mercury is a potent neurotoxin, and it is easily shattered and spread following a spill.

If you drop and break a mercury thermometer, call CEHS immediately. Do not attempt to collect the mercury droplets, sweep mercury up, or vacuum the mercury. CEHS has specialized equipment to deal with mercury spills, including a Jerome mercury vapor analyzer to measure the presence of mercury vapor. Keep people away from the spill area; be sure to check clothing and the bottoms of your shoes for mercury. If mercury is visible on clothing or shoes, remove the articles and keep them in the spill area. Open the windows and keep air flowing in the area.

Never pour mercury down the drain; never put it in the trash; never put broken thermometers in the broken glass box.

If CEHS personnel have to clean up a mercury spill in a lab, they will remove other mercury-containing devices deemed not critical. If a lab continues to use mercury-containing devices and spills mercury a second time, the lab may be charged for the clean-up.

4k) Perchloric Acid

When perchloric acid is heated above ambient temperature, the vapors that are emitted can combine with organic material, including oil and dirt, and form explosive perchlorate salts. When perchlorate salts are deposited on surfaces they may become shock-sensitive and explode when touched. Perchloric acid should not be heated above ambient temperature, except in a chemical fume hood dedicated to that application and which contains equipment to rinse the hood, ductwork and fans. Perchloric acid must be carefully separated from lipids at all times; perchloric acid and lipid mixtures can be very shock-sensitive. Do not store perchloric acid with flammables or with sulfuric acid. If a bottle of perchloric acid has turned dark, or has crystals forming around the cap, it may explode if moved. Contact CEHS for immediate assistance.

Perchloric acid should be stored with other oxidizing acids (nitric acid and sulfuric acid) and should be separated from other mineral or organic acids. Oxidizing acids must never be stored on a wooden shelf, because a fire might result from a spill or leak.

4l) Picric Acid

Picric acid is used in some biological stains. It is safe to handle when it contains at least 30% water by weight. However, if it’s allowed to dry, it becomes shock-sensitive and may explode.

Purchase picric acid in small quantities, and don’t break the seal on the bottle until you need to use it. Store it away from metallic compounds.

CEHS recommends that you record the weight of the bottle when you open it, and again after you have removed material (the “last closed weight”).

Next time the bottle is opened, compare the current weight with the last closed weight; if the bottle weighs less, water has evaporated. Add water to the container to return it to the last closed weight before you remove more picric acid.

Be sure to wipe the threads of the bottle and the inside of the cap before you replace the cap. Minute amounts of picric acid can fall into this area, dry out and become shock-sensitive; the bottle may explode next time it is opened.

4m) Hydrofluoric Acid

Hydrofluoric acid (HF) has chemical properties that render it extremely hazardous. Vapors and liquid are very corrosive to tissues.

HF attacks glass, enamel, pottery, concrete, rubber leather, many metals, and organic compounds, including human tissue.

Skin, eye, or lung exposure to concentrated HF solutions will cause immediate, severe, penetrating burns. Exposure to less concentrated solutions may have equally serious effects, but the appearance of symptoms may be delayed for up to 24 hours. If you are exposed to HF, seek medical attention immediately, even if you do not feel pain.

Before beginning work with HF, lab personnel must make sure that they have a container of calcium gluconate gel. The gel must be inspected before every use of HF; if the gel has been opened, or if it is expired, it must be discarded and a new container must be present.

Before beginning work with HF, lab personnel must also have calcium carbonate tablets (antacids) in the lab. A document folder containing a copy of this standard operating procedure and a material safety data sheet for HF must be kept in the lab to take to the hospital in the event of an exposure.

Never use HF when working alone, or after hours. All lab personnel – not only those who are using HF - must be trained *before any work with HF begins* in proper emergency response procedures in case of an accident. A sign must be posted on the door warning people that work with HF is in progress. The laboratory supervisor must keep records of this specific training.

Labs that keep or work with HF must have an operational safety shower and eyewash station in the lab. HF must always be handled in the fume hood. Lab personnel working with HF in concentrations greater than 1% must wear chemical safety goggles, a face shield, a long-sleeved buttoned lab coat, pants or skirt completely covering legs, and closed-toe shoes that completely cover the top of the foot. A lab apron is recommended. Gloves appropriate for work with HF are 22 mil neoprene or nitrile gloves.

If any HF is spilled, immediately evacuate the lab and close the door. Report spills to CEHS.

HF Emergency Response Procedure for Skin Exposure:

Move the victim immediately under the safety shower or another source of water and flush the affected area with copious amounts of cold running water for at least one minute. While the victim is being rinsed, he/she should remove protective clothing; remove the goggles last by facing into the flow of water and pulling goggles over head. Victims and responders must be extremely careful not to contaminate themselves – responders must wear heavy neoprene or heavy nitrile gloves. Following water flush, the burn area must be covered with calcium gluconate gel. Note the time that the gel was applied. Call 911 and request an ambulance. When the ambulance arrives, the EMTs should call the hospital for permission to administer calcium carbonate tablets.

HF Emergency Response Procedure for Eye Exposure:

Immediately flush eyes for at least five minutes with cool running water; call 911 and request an ambulance to transport the victim to the hospital. When the ambulance arrives, if a 1% sterile solution of calcium gluconate is available in the lab the EMTs may begin lavage.

HF Emergency Response Procedure for Inhalation:

Immediately remove victim to clean air and call 911. Inhalation of HF fumes may cause swelling of the respiratory tract up to 24 hours after exposure. Any person exposed to HF fumes must see a physician immediately.

4n) Phenol

Phenol is used for extraction and isolation of nucleic acids, usually in solution with chloroform and isoamyl alcohol, to remove protein contaminants.

Phenol is a colorless to light-pink crystal at room temperature. It is corrosive, but it also acts as a local anaesthetic, so no pain may be felt on initial contact; pain will be felt as the burn develops. Contact with the eyes can cause severe damage and blindness. Phenol is easily absorbed through the skin, and fatalities have been reported from skin absorption.

Phenol is also toxic by inhalation.

Phenol should be handled in a fume hood. Wear a laboratory coat, double nitrile gloves or neoprene gloves, and safety goggles. Make sure legs and feet are completely covered. Keep phenol away from oxidizers.

4o) Carcinogens, Teratogens, Mutagens, Acutely Toxic Chemicals

Special precautions must be taken when handling select carcinogens, reproductive toxins and substances with a high degree of acute toxicity. Included

in the category is formaldehyde, a known carcinogen, and ethidium bromide, a potent mutagen.

Quantities of these chemicals stored and used in the lab should be minimized, as should their concentrations in mixtures or solutions. Work with these substances should always be performed in a functioning chemical fume hood or glove box, in such a manner that the OSHA permissible exposure limits are not exceeded. Ventilation efficiency of these control devices must be periodically evaluated. Gases containing acutely toxic substances must be kept in a ventilated gas cabinet.

Each lab utilizing these substances must designate an area for work with them. This can be the entire lab, a fume hood, glove box, or portion of a lab. The area must be clearly marked, and a sign reading “Danger”, “Authorized Personnel Only”, the name of the specific agent, or other indication of the danger, must be posted at the area.

All personnel working in a lab which contains one of these substances must be trained by the laboratory supervisor concerning the following: possible deleterious effects of the substances; signs and symptoms of overexposure; routes of exposure; safe handling, storage and disposal of the substances. The workers in the lab must be trained even if they do not handle the substances. The laboratory supervisor is responsible for providing necessary training; the CHO will advise the lab supervisor if necessary. Training should include procedures to be followed in the event of an unintentional release of the substance.

All personnel working with these substances must have access to appropriate personal protective equipment and must be trained by the laboratory supervisor in their correct use. The Committee may require installation of detection equipment for highly toxic gases.

Waste from these substances must be correctly disposed through CEHS. Areas in which these substances are used must be periodically decontaminated and cleaned; frequency of cleaning will depend upon the substance and state of matter.

4p) Flammable Chemicals

Generally, use of open flames in the lab is discouraged, with the exception of alcohol burners used for sterilizing loops while inoculating culture plates. Open flames should not be used in laboratories unless flammable chemicals are closed and placed at least 10 feet away from flame sources.

Flammable cabinets should not be used to store acids, bases or oxidizers.

Flammable storage cabinets may not be stored in a hallway or other common area which may block egress.

The storage and use of flammable and combustible liquids must comply with the State of Illinois Fire Marshal Division rules. Class I flammable liquids shall not be permitted in basement areas or below-grade laboratory spaces. Class II and IIIA liquids shall be permitted to be stored in basements provided that automatic sprinkler protection and other fire protection facilities are provided.

41 Ill Adm. Code 160 and 41 Ill. Adm. Code 180

Class I flammable chemicals are divided into three classes:

Class IA: Include liquids having flashpoints below 73ºF (22.8ºC) and having a boiling point below 100ºF (37.8ºC). Some examples of Class I flammable chemicals include Ethyl Ether, Pentane, Propylene Oxide and Ethyl Chloride.

Class IB: Include liquids having flashpoints below 73ºF (22.8ºC) and having a boiling point at or above 100ºF (37.8ºC). Some examples of Class II flammable chemicals include: Ethanol, Acetone, Hexane, Methanol and Toluene.

Class IC: Include liquids having flashpoints at or above 73ºF (22.8ºC) and below 100ºF (37.8ºC). Some examples of Class IC flammable chemicals include: Xylene, Amyl Alcohol, Butyl Alcohol and Propyl Alcohol.

4q) Reactive Chemicals

Chemicals which react with air or water, and chemicals which may polymerize suddenly and violently, pose particular danger in labs. Air-reactive chemicals must be stored under dry nitrogen or argon and may only be used in a glove box with a dry inert atmosphere. Water-reactive chemicals must also be handled in a glove box with a dry inert atmosphere, or handled and stored under an oily solvent to exclude atmospheric moisture. All personnel working in a lab which contains reactive chemicals must be trained in specific emergency procedures for unintentional release, including steps to be taken to prevent fire or explosion of reactives, and circumstances under which building evacuation would be necessary. The laboratory supervisor must keep records of this training.

4r) Institutional Approval Requirements

Institutional committees exist to supervise and approve certain types of research activities. Each committee has specific requirements for documentation, training and protocol approval. Institutional approval from appropriate committees must be obtained before any research work begins involving human subjects, radiation, animal subjects, recombinant DNA, or pathogenic microorganisms. Some funding agencies, such as the National Institutes of Health, will not award a grant if the researcher lacks the necessary institutional approval for the project;

other agencies will not review research proposals until they have obtained the necessary approval.

The Institutional Review Board (IRB) governs work with human subjects. Information and applications can be found here.

The Radiological Control Committee formulates policies and procedures for work with radioisotopes on campus. Information to obtain approval for this work can be found here.

Vertebrate animal use on campus is controlled by the Institutional Animal Care and Use Committee (IACUC). Information and forms for animal use can be found here.

The Institutional Biosafety Committee (IBC) oversees work with hazardous biological agents. Biological materials covered by the standards include living organisms, products produced by such organisms, organic chemicals produced to mimic activity/actions of such products, and recombinant DNA. Researchers must submit a Memorandum of Understanding and Agreement (MUA) to the IBC before beginning work with these items. More information can be found here.

Human stem cell research is supervised by the Stem Cell Research Oversight Committee (SCRO), which must approve such work regardless of funding source. Work with human stem cells may require the approval of one or more of the other institutional committees in addition to the SCRO approval. More information can be found here.

4s) Laboratory Opening and Closing Procedures

Principal investigators whose labs are closed due to retirement or resignation must leave their laboratories in a state which is safe, clean, and suitable for a new occupant. The Department is primarily responsible for ensuring that the lab is suitable for a new tenant. Principal investigators, who leave the University, or no longer conduct research, must complete a “Laboratory Close-Out Checklist” form with a representative of CEHS. Failure to do so may result in a fine.

Principal investigators who are newly occupying space must meet with a representative of CEHS to complete a “Laboratory Opening Checklist” within 30 days of occupying lab space. This ensures that new faculty members are aware of the requirements for regulatory compliance.

The “Laboratory Close-Out Checklist” is attached as Appendix D. The “Laboratory Opening Checklist” is attached as Appendix E.

5. Employee Information and Training

All workers in laboratories who might be exposed to hazardous chemical agents must receive information and training before beginning any work. Contact CEHS or find the calendar for training on the CEHS website for upcoming training sessions: https://cehs.siu.edu/about/calendar.php Provision of appropriate information and training is the responsibility of the laboratory supervisor. Employees must attend a training session conducted by CEHS discussing laboratory chemical safety and hazardous waste once each year. Laboratory supervisors must keep a record of employee training, and the record must be updated annually. Records are kept in the Chemical and Biological Safety Manual in the lab.

Information

Laboratory workers will be informed of the location and availability of the following documents:

-OSHA Lab Standard, 29 CFR Part 1910.1450

-Chemical Hygiene Plan

- Safety data sheets (SDSs) and other reference material for chemical and biologic safety

-Documents listing permissible exposure limits (PELs) for OSHA regulated substances, and any applicable recommended exposure limits (RELs) and threshold limit values (TLVs)

-Documents listing signs and symptoms associated with exposure to hazardous chemicals and biologic agents found in the lab.

Training

Each worker shall be trained for the following prior to working with hazardous chemical or biologic agents:

-Detection methods and observations used to identify the presence or release of a hazardous chemical (e.g. visual appearance, odor, monitoring devices)

-Physical and health hazards of chemicals in the lab

-Appropriate work practices and personal protective equipment to prevent exposure

-Emergency procedures in the event of unintentional chemical release

Basic chemical safety training can be provided by CEHS; laboratory-specific training will be provided by the lab supervisor.

Any person who works in a lab which contains formaldehyde needs to receive formaldehyde training upon initial assignment, and on an annual basis thereafter, by CEHS staff. Contact CEHS at 453-7180 to schedule this training.

6. Non-laboratory Personnel Information and Training

Non-laboratory personnel who enter and work in labs can include plumbers, electricians, sheet metal workers, custodians, and other administrative personnel. Any employee or visitor in a laboratory where hazardous chemicals are used or stored must either receive chemical safety training prior to entry, or must be accompanied by laboratory personnel.

When the possibility of chemical contamination exists, protective clothing should be worn over street clothes. It is recommended that everyone in the laboratory wear appropriate attire, including gloves, safety glasses or goggles, and lab coats, according to the hazards present. Disposable outer garments, such as Tyvek suits, are useful when performing maintenance work in laboratories. Additional personal protective equipment, particularly gloves and eyewear, should be used as hazards warrant.

7. Medical Consultation

An opportunity for medical consultation will be provided to workers under the following circumstances:

-If a worker develops any symptom thought to arise from a chemical exposure

-After an event such as a spill, leak, or explosion which may result in exposure

-If an exposure is identified as the result of an evaluation by the lab supervisor

Any medical consultation required will be provided without cost to the worker, without loss of pay, and at a reasonable time and place. Generally, during normal working hours Student Health Service will provide such consultations; after hours or on weekends, Memorial Hospital of Carbondale will be the consultant. Any person suffering an accident or exposure resulting in serious or life-threatening injury should be transported to the hospital by ambulance.

Appendix A: Definitions and Acronyms

Chemical Hygiene Officer: an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the Chemical Hygiene Plan.

Chemical Hygiene Plan: a written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment, and work practices that are capable of protecting employees from the health hazards presented by hazardous chemical used in that particular workplace, and which meets the requirements of 29 CFR 1910.1450.

CHO: Chemical Hygiene Officer.

CHP: Chemical Hygiene Plan, referred to as the Plan within the document.

Designated Area: an area which may be used for work with select carcinogens, reproductive toxins, or substances which have a high degree of acute toxicity. A designated area may be the entire laboratory, an area within a laboratory, or a device such as a chemical fume hood or glove box.

EPA: Environmental Protection Agency.

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: 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.

OSHA: Occupational Safety and Health Administration

Oxidizer: A chemical, other than a blasting agent or explosive, that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

PEL: Permissible exposure limit. PELs are regulatory limits for exposure to a chemical substance in the air or on skin.

Physical hazard: A combustible liquid, compressed gas, oxidizer, organic peroxide, or a material with explosive, flammable, pyrophoric, or reactive properties.

PPE: Personal protective equipment, including gloves, gowns, coats, face shields, glasses, goggles, aprons and shoe covers.

Reproductive Toxin: A chemical which affects reproductive capabilities, including those which cause chromosomal damage (mutagenesis) and those which damage fetuses (teratogens).

Select Carcinogen: Any substance which meets one of the following criteria:
(a) it is regulated by OSHA as a carcinogen; (b) it is listed under the category “known to be carcinogens” in the Annual Report on Carcinogens published by the Nation Toxicology Program; (c) it is listed under Group 1, carcinogenic to humans, by the International Agency for Research on Cancer Monographs; (d) it is listed in either group 2A or 2B by the International Agency for Research on Cancer Monographs or under the category “reasonably anticipated to be carcinogens” by the National Toxicology Program and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria: after inhalation exposure of 6-7 hours per day for 5 days per week for a significant portion of a lifetime to dosages of less than 10 mg per cubic meter; or after repeated skin application of less than 300 mg per kg body weight per week; or after oral dosages of less than 50 mg per kg of body weight per day.

Appendix B

Southern Illinois University Carbondale
Employee Laboratory Training Record

The SIUC Chemical Hygiene Plan requires that laboratory supervisors train their employees regarding the following topics:

-The location and availability of the OSHA Lab Standard, SIUC Chemical Hygiene Plan, material safety data sheets, other chemical safety reference materials, and OSHA PELs, if applicable;

-Signs and symptoms associated with exposure to the hazardous chemicals with which the employees work;

-Observations and detection methods which may be used to identify the presence or release of a hazardous chemical in the lab (e.g. odor, visual appearance, monitoring equipment);

-Physical and health hazards of the materials with which employees work;

-Good work practices, appropriate personal protective equipment, and emergency procedures to be used, in order to protect employees from exposure to the hazardous chemicals with which they work.

In addition to training given by the lab supervisor, it is incumbent upon the employee to seek information or training when unsure of proper procedures or hazards posed by a chemical, and to follow health and safety rules when working in the lab.

_____ _____
Employee's Signature Date

_____ _____
Print Employee's Name Last 4 digits SIU ID Number

_____
Print Lab Supervisor's Name

Appendix C
Report of Injury or Incident
Center for Environmental Health and Safety
453-5187

I. PERSON INVOLVED IN INCIDENT	**Name** (Last, First, Mi)		**Sex** ☐ F ☐ M	**E-Mail**
	Date Of Birth			**Social Security #:**
	Address (Local)			**Phone** (W) _____ _____ _____ (H) _____ _____ _____
	Status At Time Of Incident ☐ Employee ☐ Visitor ☐ Student ☐ Other (Specify):	**If An Employee**, Give Job Title And Department		**If A Visitor**, State Purpose Of Campus Visit
	OTHERS WERE INVOLVED, ATTACH ADDITIONAL COPIES OF THIS FORM FOR EACH PERSON			
	Did Incident Arise Out Of And In The Course Of University Employment? ☐ Yes ☐ No			
II. INCIDENT/ OR HAZARD DESCRIPTION	**Place** Where Accident/Incident Occurred Or Hazard Is Located	**Date & Time** Of Incident	**Name Of Area Supervisor** Where Incident Occurred Or Hazard Is Located.	
	Describe Activity Being Performed By Person Involved In Incident (I.E. Driving Truck, Lifting Crate, Etc.)			
	Fully Describe Incident/Hazard (Attach Additional Sheets If Necessary.)			
	List Any Witness Present Name	Address	Phone (W) ____ ___ _____	
	Additional Witness(es) Present Name	Address	Phone (W) ____ ___ _____	
III. INJURY	Did This Incident Result In Injury To The Person Involved? ☐ Yes ☐ No			
	IF INJURY OR ILLNESS RESULTS FROM AN INCIDENT ARISING OUT OF AND IN THE COURSE O UNIVERSITY EMPLOYMENT, THE INJURED PERSON OR THEIR SUPERVISOR (If injured person is MUST CALL Tristar AT 1-855-495-1554 AND REPORT THE INJURY OR ILLNESS			
	Describe Nature And Scope Of Personal Injury, If Any **Was Medical Care Sought**? ☐ No ☐ Yes: Place & Date of Treatment _____			
IV. PROPERTY DAMAGE	**Describe Property Damage**, If Any			
V. SIGNATURE	**Printed Name** Of Person Completing Form		**Job Title/Occupation**	
	_____ _____ **Signature** Of Person Completing Form Date		**Phone Number** (W) _____ _____ _____ (H)_____ _____ _____	

Appendix D
Laboratory Close-Out Procedure

Rationale

Principal Investigators whose labs are closed due to retirement or resignation must leave their laboratory in a state which is safe, clean, and suitable for new occupation. All hazardous materials must be identified and removed or re-assigned; laboratory equipment must be properly cleaned and decontaminated. Unidentified hazardous material in laboratories is a violation of State and Federal statutes. Laboratories which are left dirty and cluttered pose a danger to new tenants.

Responsibilities

Principal Investigators are responsible for ensuring that all laboratory chemical, biological, and radiological hazardous materials have been identified, re-assigned to other personnel, or removed for disposal prior to leaving the university. They are responsible for completion of all activities on the close-out checklist, including cleaning lab surfaces and equipment.

Departments are responsible for insuring that Principal Investigators comply with the requirements in the close-out checklist.

The Center for Environmental Health and Safety (CEHS) is responsible for providing guidance to the Principal Investigator for appropriate removal of hazardous material and proper cleaning of the lab.

Enforcement

When the appropriate procedure for lab closing is followed, CEHS will provide guidance, and will remove and dispose of hazardous material at no charge to the Principal Investigator or Department.

If the Principal Investigator fails to complete the lab close-out, any additional costs for labor in reference to completion of the close-out checklist (e.g. hazardous material identification or laboratory cleaning) incurred by CEHS will be billed to the Department. It is the Department’s ultimate responsibility to ensure compliance with the close-out procedure.

Laboratory Close-Out Checklist

The following checklist is a guide for procedures to discontinue or vacate lab space. Please contact CEHS 60 days prior to vacating the lab. For more information, call CEHS at 453-7180 or visit our website: www.cehs.siu.edu

Building _____ Laboratory Number_____

Department _____

Principal Investigator_____

CEHS Representative _____

Chemicals

Activity	Date Lab Completed	CEHS Initials
All containers of chemicals are completely labeled with the chemical name. Abbreviations, chemical formulae, or structures are not acceptable. Make attempts to identify any unknown substances.		
All containers are securely closed with a screw-type cap; all beakers, flasks and other containers are emptied and cleaned.		
All chemicals and samples have been removed from refrigerators, freezers, bench tops, and fume hoods.		
Chemicals suitable for research purposes are re-assigned to another investigator and removed from the lab. Transfer responsibility for chemicals to: _____		
Hazardous waste containers, including chemicals not re-assigned, are labeled with the appropriate yellow label and collected in one area. Hazardous chemicals cannot be disposed to the trash or to the sewer.		
DEA controlled substances have been transferred to another investigator with the appropriate Form 222, or disposal has been requested with the appropriate Form 41. Transfer responsibility for DEA substances to: _____		
Arrangements for shipping chemicals to another institution have been made with the Department, in cooperation with CEHS.		
A chemical waste pickup request has been filed with CEHS at www.cehs.siu.edu		

Biological Materials

Activity	Date Lab Completed	CEHS Initials
Frozen specimens of human or animal tissue for disposal have been identified and collected in one freezer. Biological waste must have a “Biohazard Waste” label attached.		
Chemically preserved specimens of human or animal tissue for disposal have been drained of storage fluid, the fluid collected and identified as hazardous chemical waste, and the tissue collected, double-bagged and placed in a cardboard biohazard waste box, available from CEHS.		
All sharps – hypodermic needles, syringes, scalpels, razor blades and Pasteur pipettes – have been placed in a sharps container; all containers have been moved to one area of the lab.		
Frozen or preserved specimens for transfer to another institution have been clearly marked and segregated from waste.		
Arrangements for shipping biological materials to another institution have been made with the Department, in conjunction with CEHS.		
A biological waste pick-up request has been filed at www.cehs.siu.edu		

Compressed Gas Cylinders

Activity	Date Lab Completed	CEHS Initials
Compressed gas cylinders have been returned to the vendor or reassigned to another investigator.		
Cylinders scheduled for vendor pick-up are disconnected from equipment, regulators removed, capped, and secured.		

General Laboratory Clean-Up

Activity	Date Lab Completed	CEHS Initials
All bench top disposable liners or covers have been removed and appropriately disposed.		
All bench tops have been cleaned and disinfected with agents appropriate to potential contaminants.		
All drawers and cabinets have been emptied and cleaned.		
Broken glass has been placed in a cardboard glass disposal box, the box has been sealed, and the sealed box has been placed in a dumpster.		
All signs and labels have been removed from the lab and lab door (emergency posters, phone lists, radiation labels, biohazard labels).		

Laboratory Equipment

Activity	Date Lab Completed	CEHS Initials
Refrigerators and freezers are empty, defrosted, and have been cleaned with an appropriate disinfectant.		
Incubators, autoclaves, ovens, and other equipment remaining in the lab have been appropriately cleaned according to manufacturers' directions.		
Incubators and water baths have been drained of all standing water.		
Glassware remaining in the lab has been cleaned and placed in cabinets or drawers.		
A request has been filed with Surplus Property for removal of old or nonfunctioning equipment with an SIU tag, and this equipment has been clearly marked and segregated.		
Old material, and equipment without an SIU tag that is not suitable for use, has been recycled or disposed.		
Broken glass has been appropriately disposed.		
All drawers and cabinets have been cleaned.		
All bench tops have been cleaned.		
Fume hoods and biosafety cabinets have been cleaned and emptied.		
Any equipment to be transferred to another institution has been identified and segregated, and appropriate shipping arrangements have been made.		
Arrangements have been made with Building Services to clean the floor and remove trash.		

Surplus Property

Activity	Date Lab Completed	CEHS Initials
Lab equipment for disposal that has an SIU tag must be disposed through Surplus Property; equipment must be decontaminated.		
A request has been filed with Surplus Property for removal of the equipment.		
Equipment for Surplus Property has been segregated and clearly marked.		
Computers for disposal must be scrubbed or over-written in compliance with applicable policies.		

Shared Areas

Activity	Date Lab Completed	Department Initials
The Principal Investigator, accompanied by the Department representative, has toured all shared areas (darkrooms, prep rooms, cold rooms, etc.) and clearly identified all material.		
Any chemicals in shared areas have been removed or re-assigned to other investigators.		
All biological material in shared areas have been removed or re-assigned to other investigators.		
All equipment in shared areas has been cleaned, and emptied if appropriate.		

Note: Packaging and handling of chemical, biological and radiologic agents must only be performed between the hours of 8 am and 4:30 pm, so personnel from CEHS will be available to respond to spills or releases.

Once all of the applicable close-out procedures have been completed, please contact CEHS for a close-out inspection. This should be scheduled at least two weeks prior to departure.

Appendix E
Laboratory Opening Procedure

Rationale

CEHS will perform an inspection of any laboratory prior to occupation by a new faculty member, or before laboratory space re-assignment. This inspection will help assure compliance with applicable State and Federal statutes. The CEHS inspectors must be accompanied by the new Principal Investigator, or his/her representative, to facilitate understanding and application of lab safety requirements.

Laboratory Opening Checklist

Building _____ Laboratory Number_____

Department _____

Principal Investigator_____

CEHS Representative _____

Laboratory Equipment

Activity	Date Lab Completed	CEHS Initials
Locate safety shower, tested within last 12 months		
Locate eyewash station, test for flow		
Locate fire extinguisher. Type of fire extinguisher: _____		
Fume hoods: Cleaned, and flow checked within last 12 months		
Refrigerators and microwaves marked “No Food or Drink”		

Chemical Storage, after one month of occupancy

Activity	Date Lab Completed	CEHS Initials
Chemicals separated according to hazard categories: acids, bases, flammables, oxidizers, reactives		
Liquids stored separately from solids, in secondary containment		
Satellite chemical waste accumulation area established and identified		
Chemical inventory present and dated within last month		
Gas cylinders properly secured, and empty cylinders tagged		

Training

Activity	Date Lab Completed	CEHS Initials
All chemical users scheduled to attend laboratory safety training through CEHS		
All radioisotope users scheduled to conduct online training and take test at CEHS		
All researchers using human blood, blood-derived body fluids or other potentially infectious material scheduled to attend bloodborne pathogens training at CEHS		

Paperwork

Activity	Date Lab Completed	CEHS Initials
Chemical Hygiene Plan present and updated		
Chemical Waste Management Guide present and updated		
Satellite waste accumulation area inspections performed monthly		
Training records completed and up-to-date		
Safety Data Sheets available. Location of SDSs: _____		

Lab Signs

Activity	Date Completed	CEHS Initials
“No Food or Drink” sign on door		
Emergency Contingency poster filled out completely and posted inside lab		
Radiation sign posted, if necessary		

Personal Protective Equipment

Activity	Date Completed	CEHS Initials
Lab coats for all employees		
Eye protection available, based on hazards present: safety glasses, safety goggles, and/or face shields		
Nitrile gloves available		
Aprons available, if hazards justify their use		

Appendix F

Pictograms of Hazard Warnings
Required by the Hazard Communication Standard

Environmental Hazard

Health Hazard

Flammable

Danger

Corrosive

Acute Toxicity

Compressed Gas

Oxidizer

Explosive