



LABORATORY CHEMICAL HYGIENE PROGRAM

This Laboratory Chemical Hygiene Program, is intended to assure compliance with occupational safety and health standards covering employees engaged in the laboratory use of hazardous chemicals as defined in 29 CFR 1910.1450. It represents official Southwest Tennessee Community College policy on the possession, storage, and use of hazardous chemicals in laboratories.

This program is subject to review and modification on an annual basis.

SOUTHWEST

TENNESSEE COMMUNITY COLLEGE

SOUTHWEST

TENNESSEE COMMUNITY COLLEGE

LABORATORY CHEMICAL HYGIENE PROGRAM

TABLE OF CONTENTS

General Principles	3
Responsibilities	3
Employee Information and Training.....	4
Personal Protective Equipment.....	5
Medical Consultations and Examinations.....	6
Chemical Procurement.....	7
Prior Approval of Procurement.....	7
Chemical Storage	8
Prior Approval of Laboratory Activities	10
Off-Hours Work Procedures, Sole Occupancy	
Hazardous Work, Unattended Operations	
Laboratory Facilities	
Ventilation	11
Fume Hoods.....	12
Environmental Monitoring, Decommissioning, and Personal Work Practices	
and Chemical Handling	13
Accidents and Spills, Personal Contact with Chemicals, Spills	15
Chemical Releases to the Environment	16
Special Precautions, Designated Areas, Allergens and Embryotoxins	16
Chemicals of Moderate Chronic or High Acute Toxicity.....	17
Chemicals of High Chronic Toxicity	18
Animal Studies	19
Housekeeping, Maintenance, and Inspections Records.....	20
Signs and Labels	
Waste Disposal.....	21
Empty Containers.....	22
Annual Audit of Plan Effectiveness	23

ADDENDUM

TENNESSEE COMMUNITY COLLEGE

General Principles

This document, known as the Chemical Hygiene Plan (CHP) or the Plan, is designed to minimize exposures to hazardous materials in laboratories and protect the health and safety of laboratory employees. Implementing the Plan should be a continuing effort on the part of everyone.

Copies of this Plan shall be available for employee review in the office of each department chair affected by the Plan.

Responsibilities

The president of Southwest Tennessee Community College has ultimate responsibility for chemical hygiene within the college and, with other administrators, chairs, and directors, provides continuing support for Southwest's Laboratory Chemical Hygiene Program.

The Chemical Hygiene Committee governs the development and implementation of the Chemical Hygiene Program. The members of this committee are selected from the faculty and staff on the basis of their knowledge and experience with chemical use in academic laboratories.

The Chemical Hygiene Officer is the chief administrative officer for the Laboratory Chemical Hygiene Program. The Chemical Hygiene Officer's duties include the following:

- Working with administration, the Chemical Hygiene Committee, and other employees to develop and implement appropriate chemical hygiene policies and practices
- Monitoring procurement, use, and disposal of chemicals used in laboratories
- Seeing that appropriate audits are maintained
- Helping faculty ensure that facilities are adequate for specific chemical use and to develop necessary safety precautions
- Knowing the current legal requirements concerning regulated substances
- Working to continuously improve the Southwest CHP

Faculty and Lab Assistants have overall responsibility for chemical safety in the laboratory, including:

- Ensuring that laboratory workers know and follow the chemical hygiene rules, that personal protective equipment is available and used, and that appropriate training has been provided
- Providing regular chemical safety and housekeeping inspections, including inspection of emergency equipment
- Ensuring that facilities and equipment for use of any chemical are adequate
- Knowing the current legal requirements concerning regulated chemicals
- Determining the requirements of use of protective apparel and equipment
- Initiating and following up on action to eliminate hazards and/or unsafe conditions within their laboratory areas

SOUTHWEST GENERAL PRINCIPLES AND RESPONSIBILITIES/ EMPLOYEE TRAINING AND INFORMATION TENNESSEE COMMUNITY COLLEGE

Laboratory Workers shall be responsible for the following:

- Planning and conducting operations in accordance with this Chemical Hygiene Plan
- Developing good personal chemical hygiene habits
- Following all rules, regulations, and instructions pursuant to occupational safety and health standards
- Wearing prescribed personal protective equipment
- Reporting unsafe conditions and practices to their supervisor

Employee Training and Information

It is the responsibility of each department chair to establish an information and training program to assure that all individuals at risk are adequately informed of the work done in the lab, its risks, and what to do in case of accident.

Information given to employees shall assure that they are apprised of the hazards presented by chemicals used in the laboratory. Each employee shall receive training at the time of initial assignment to the laboratory, prior to assignments involving new exposure situations, and at regular intervals as determined by the laboratory supervisor or Chemical Hygiene Committee. Training should be a continuing activity rather than an annual event

Training shall include methods of detecting the presence of hazardous chemicals; physical and health hazards of chemicals in the lab; measures employees can take to protect themselves and others from these hazards; details of this Chemical Hygiene Plan, including the contents of the OSHA Laboratory Standard (29 CFR 1910.1450) and its appendices; the location and availability of the Chemical Hygiene Plan; permissible exposure limits for OSHA regulated substances or recommended exposure values for other hazardous chemicals not regulated by OSHA which are present in the laboratory; signs and symptoms associated with exposure to the chemicals present in the laboratory; and location and availability of reference material on chemical hygiene. The Chemical Hygiene Officer or designee shall offer formal training at least annually.

Every lab worker shall know the location and proper use of protective apparel and emergency equipment and should have the opportunity to receive first aid training.

Literature and consulting advice about chemical hygiene should be readily available to lab workers, and they should be encouraged to use these resources. A copy of the Southwest Safety Manual should be among these resources.

Personal Protective Equipment

It is the obligation of affected departments to determine the need for personal protective equipment (PPE) based on hazards in the work place. Where a hazard assessment indicates the need for PPE, departments shall provide PPE at no cost to the employee. However, if PPE is suitable for use outside the work environment and not subject to contamination, employees may be required to pay for such items. PPE provided shall be appropriate for substances being handled.

Laboratory coats of appropriate types shall be provided and worn. Laboratory coats shall be discarded upon significant contamination.

All employees and visitors shall wear appropriate eye protection upon entering the lab.

Gloves designed to resist the chemical being handled shall be worn when appropriate, inspected before use, washed before removing from hands, and replaced periodically.

Appropriate respiratory equipment shall be used when contaminants are not sufficiently restricted by engineering controls. However, employees using respirators are required to be properly trained, have periodic medical evaluations, and must follow the Southwest Respirator Program.

All respirators shall be inspected routinely before and after each use. A respirator that is not routinely used but held ready for emergency use shall, in addition to inspection before and after each use, be inspected at least monthly and the inspection documented on forms provided. Self-contained breathing apparatus shall receive a documented inspection at least monthly. Follow guidance in the Respirator Program in selecting, cleaning, maintaining, and using respirators.

All laboratory employees who might be exposed to chemical splashes shall be instructed in the location and proper usage of emergency showers and eyewashes.

Medical Consultations and Examinations

An opportunity to receive medical attention is available to all employees who work with hazardous chemicals in the laboratory. Medical consultations and examinations shall be provided to qualifying employees without cost, without loss of pay, and at a reasonable time and place.

Employees shall be offered the opportunity for medical attention under the following circumstances:

- Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory
- Whenever an event takes place in the laboratory such as a spill, leak, explosion, or other occurrence resulting in the likelihood of a hazardous exposure
- Where exposure monitoring reveals an exposure level above the action level for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements

In the case of a spill, leak, etc. of a hazardous chemical, medical attention shall, at a minimum, be in the form of a medical consultation for the purpose of determining the need for a medical examination; where exposure levels exceed the action level, medical attention shall, at a minimum, be in the form of medical surveillance.

These medical consultations and examinations shall be administered by, or under the direct supervision of, a licensed physician. The Benefits Section of the Department of Human Resources maintains a current list of available physicians.

In the event that first aid assistance is required or injuries are severe, Public Safety shall be contacted at (901) 333-5555 on the Union Avenue Campus, (901) 333-4242 on the Macon Cove Campus, or (901) 333-6045 at the Maxine A. Smith Center for emergency medical assistance.

Chemical Procurement

The decision to obtain a chemical is a commitment to store, handle, and use the material properly from receipt through disposal.

Requests for new chemicals shall be submitted through the department chair and processed by one or more individuals designated by the chair to order chemicals for the department. Those ordering chemicals are, for waste minimization purposes, obligated to look at existing stocks of chemicals to determine local availability prior to bringing new chemicals on campus.

All involved personnel prior to procurement of a chemical shall know information on proper handling, storage, and disposal.

Chemicals utilized in the laboratory shall be limited to those that are appropriate for the ventilation system and other facilities.

Where possible, all chemicals shall be received in a central location within each building or department. Personnel who receive chemical shipments shall be knowledgeable of the proper procedures for receipt. Chemical containers shall not be accepted without accompanying labels, Material Safety Data Sheets (MSDSs), and packaging in accordance with appropriate regulations.

The Safety & Health department shall be responsible for maintaining a master file of all MSDSs. Departments shall assure that chemical vendors provide an original copy of the MSDS to Safety and Health. Safety and Health shall then return a copy of the MSDS to the ordering department that shall maintain these copies so as to be readily accessible to employees.

All chemical containers shall be dated to indicate when the containers are received and when they are opened. Those chemicals known to form potentially explosive peroxides shall carry a peroxide former label. This label should be completed appropriately and affixed by laboratory personnel upon receipt of peroxide formers. A list of potential peroxide formers and recommended shelf life may be found at the end of this manual.

Prior Approval of Procurement

Where select carcinogens, substances with reproductive hazards, substances of high acute toxicity, and explosives are to be procured, standard operating procedures must assure that persons using such substances are familiar with the hazards and regulatory requirements. The chair of a department where such substances are to be used should grant written approval acknowledging that the MSDS has been read, that the regulations are understood, that facilities are available to support use of the material, and that procurement, storage, and use is approved.

Chemical Storage

Received chemicals shall be immediately moved to an appropriate storage area, or, in cases where centralized storage is not available, to the laboratory requesting the chemical.

When chemicals are taken to/from the storage area, they shall be placed in unbreakable outside containers or buckets capable of containing the chemicals in case of inner container breakage.

Storage areas shall be well illuminated, with all chemical storage maintained below eye level. Large bottles shall be stored no more than three (3) feet from floor level.

Storage shelves shall be structurally sound, level, secured to the wall or other source of mass to prevent toppling, have lips or seismic wires to prevent containers from slipping off the edge, and be constructed of material appropriate for the chemicals stored.

Chemicals, including compressed gases, shall be segregated by hazard classification and compatibility in a well-identified area with adequate ventilation.

Mineral acids shall be separated from flammable and combustible materials; however, organic acids may be stored in approved storage cabinets with flammables and combustibles. Storage within the same fire area is acceptable; however, separation by as much space as practicable or by intervening storage is necessary.

Acid-resistant trays shall be placed under bottles of acids. Where potentially incompatible liquids of the same hazard class are stored in the same cabinet or other enclosure, items shall be segregated in separate pans designed to contain spills and isolate materials from each other.

Acid-sensitive materials such as cyanides and sulfides shall be separated from acids or otherwise protected from contact with acids.

The storage area shall not be used as a preparation or repackaging area.

The storage area shall be accessible during normal working hours and shall be under the control of a person designated by the department chair.

Storage of chemicals at lab benches or other work areas shall be limited to amounts necessary for one operation or shift. The container size shall be the minimum convenient, and the amounts of chemicals at the lab bench shall be as small as practical.

Chemicals in storage shall not be exposed to sunlight or heat.

Chemicals shall be examined at least annually by laboratory personnel for deterioration and container integrity; the inspection should also determine whether corrosion or other damage has occurred to the storage facility as a result of leaking chemicals. Unneeded items shall be held for proper disposal or redistribution to other labs that have an immediate use for them.

Peroxide formers stored for the recommended shelf life shall be withdrawn for disposal or tested for peroxides and re-dated if peroxidation is not evident. Under no circumstances shall peroxide formers be stored or used after the manufacturer's expiration date or when the container shows rust or other signs of deterioration.

Flammable liquids shall not be placed in refrigerators or cold rooms that are not designed and functioning as flammable storage units or explosion proof units. Regular refrigerators shall not be used unless modified to meet flammable storage standards as found in NFPA 45.

Toxins shall be segregated in a well-identified area with local exhaust ventilation where possible. Highly toxic chemicals or others whose containers have been opened should be stored in unbreakable secondary containers.

Cylinders of compressed gases having health hazard ratings of 3 or 4 (NFPA criteria) and cylinders of gases with a health hazard rating of 2 with no physiological warning properties shall be kept in a continuously ventilated fume hood or other enclosure. No more than three such cylinders shall be stored in any one enclosure.

All cylinders of compressed gases shall be stored in well-ventilated areas, with protective caps securely in place, and secured with chains or straps to minimize the probability of falling. Cylinders shall be segregated by hazard class (e.g., flammables away from oxidizers).

When hazardous chemicals are transported by elevator, a freight-only elevator shall be used or signs placed in the elevator to prohibit personnel from entering. No one should ride in elevators transporting hazardous chemicals unless appropriate personal protective equipment is worn.

Prior Approval of Laboratory Activities

A permit system shall be used for approval of laboratory activities that present specific, foreseeable hazards to employees. These activities include off-hours work, sole occupancy of building, hazardous operations, and unattended operations. A signed memorandum from the department chair may serve as a Chemical Hygiene Permit.

Off-Hours Work Procedures

Laboratory personnel shall not engage in hazardous laboratory activities after normal working hours (as defined by the department chair) except when permission is granted through a signed Chemical Hygiene Permit.

Sole Occupancy

Except when permission is granted through a Chemical Hygiene Permit, work shall not be performed in the laboratory when the only building occupant is the laboratory person performing the work. Under such conditions crosschecks, periodic checks by Public Safety, closed circuit television, or other measures should be examined for practicality and implemented.

Hazardous Work

All hazardous operations are to be performed during a time when at least two persons are present in the laboratory. At no time shall a laboratory worker, while working alone in the laboratory, perform work which is considered hazardous. The determination of hazardous operations shall be made by the laboratory supervisor and/or the department chair with guidance from Safety and Health.

Unattended Operations

When operations are performed which will be unattended by laboratory personnel (continuous operations, overnight reactions, etc.), the following procedures shall be employed:

- The permit system shall be utilized;
- The laboratory supervisor shall review procedures to ensure safe completion;
- Appropriate signs shall be posted at all entrances to the laboratory;
- The overhead lights in the laboratory shall be left on;
- Precautions shall be made for the interruption of utility service during the unattended operation (loss of water pressure, electricity, etc.); and
- The person responsible for the operation will return to the laboratory at the conclusion of the operation to assist in the dismantling of the apparatus.

Laboratory Facilities

The laboratory facility should have the following:

- An appropriate general ventilation system with air intakes and exhausts located to avoid intake of contaminated air
- Adequate, well-ventilated stockrooms/storerooms
- Laboratory hoods and sinks, including a sink for personnel decontamination
- Readily accessible drench-type safety showers, plumbed eye washes, first aid kits, fire extinguishers and fire alarm systems which include any isolation rooms, telephone, spill control material, and other emergency equipment
- Arrangements for waste disposal
- Proper personal protective equipment

Equipment should undergo continuing appraisal and should be modified if inadequate.

The work conducted in a laboratory, and the scale of the work, must be appropriate to the physical facilities available and the quality of ventilation.

Ventilation

The general lab ventilation system should provide a source of air for breathing and for input to local ventilation devices. The system should not be relied upon to protect personnel from toxic substances released into the lab. General ventilation should ensure that lab air is continually replaced, preventing increased air concentrations of hazardous materials during the work shift.

There should be direct airflow to the lab from non-lab areas and out the exterior of the building. General airflow should not be turbulent and should be uniform throughout the lab.

Four (4) to twelve (12) room air changes per hour is normally adequate ventilation if local exhaust systems such as fume hoods are used as the primary method of exposure control.

Ventilation system alterations should be made only if testing indicates that worker protection from airborne toxins will not continue to be adequate.

Quality and quantity of ventilation should be evaluated on installation, monitored periodically, and re-evaluated when any change in local ventilation devices is made.

A lab hood with 2.5 linear feet of hood space per person should be provided for every 2 workers if they spend most of their time working with chemicals.

Use fume hoods and other local ventilation devices to prevent exposure to airborne chemicals by preventing their escape into the working atmosphere; vent any apparatus that may discharge toxic chemicals into local exhaust devices, treating discharge air before release into the system.

Permissible exposure limits (PELs) and threshold limit values (TLVs) shall not be exceeded unless engineering controls are impractical and a respiratory protection program is implemented in accordance with regulations and College Operating Procedures. Observe the PELs, TLVs, and action levels set for chemicals.

Ventilated storage cabinets and canopy hoods should be provided as needed.

Fume Hoods

Fume hoods shall be used for work with any substance with a TLV of less than 50 ppm, where carcinogens or reproductive toxins are utilized, and for any operations which may result in release of toxic vapors, mist, fumes, or dust.

Before use, each hood shall have a continuous monitoring device to allow convenient confirmation of adequate hood performance. If this isn't possible, working with substances of unknown toxicity should be avoided or other types of local ventilation devices provided. Confirm adequate hood performance before use.

Hood face velocity shall be between 80 and 120 feet per minute as documented on annual inspection stickers affixed to each fume hood by Physical Plant or Safety and Health. Do not use a hood which has not been inspected within the past twelve months.

Hoods that are non-functional or performing poorly should be reported to the Physical Plant at 333- 4241 for immediate service.

The hood sash should be kept closed except when adjustments inside the hood are being made.

Keep materials stored in hoods to a minimum, and do not allow them to block vents or airflow.

Place all apparatus and materials back at least six (6) inches from the front of the hood.

Leave the hood on when not used if toxins are stored in it or if uncertain whether adequate ventilation will be maintained when the hood is off.

Stop all work requiring a fume hood if electrical service fails, close the sash, and leave the area when there is risk of harmful fumes entering the laboratory.

Ductless hoods are considered unsuitable for materials other than nuisance vapors and dusts that do not present fire or toxicity hazards.

Environmental Monitoring

Regular monitoring of air is not usually needed in labs but may be appropriate when testing or redesigning hoods or other ventilation systems, when highly toxic chemicals or carcinogens are stored or used regularly (3 times a week), or where ventilation may be suspect. Where certain substances such as formaldehyde are used, routine air sampling may be required under occupational safety and health regulations.

Laboratory personnel shall be informed of the results of air sampling by the responsible department within 15 days of receiving such results. Contact the Safety department for guidance where air sampling or other industrial hygiene services may be needed.

Decommissioning

Upon completion of a laboratory supervisor's association with the college or transfer to another lab, the department chair shall assure that all hazardous materials under that person's supervision are disposed of, transferred to another lab, or removed to storage. Strict adherence to this policy will reduce the likelihood of accumulating orphaned chemicals, some of which may become dangerously unstable. Uncontrolled inventories of hazardous materials eventually lead to storage problems, increased hazardous waste disposal costs, and potentially unsafe conditions.

Personal Work Practices and Chemical Handling

Each employee, through training, supervision, encouragement, and experience, shall develop and implement safe working habits in accordance with this document and Southwest Health and Safety Policy and Procedures. In so doing, chemical exposures will be minimized.

Safe work habits should extend to chemicals without known hazards, assuring that exposure will be as low as reasonably achievable and under-estimation of risk avoided. Assume that any mixture will be more toxic than its most toxic component and that all substances of unknown toxicity are toxic.

Splash goggles shall be worn where the possibility of a chemical splash is significant; more stylish eyewear with side shields may be worn in low risk areas at the discretion of the laboratory supervisor. In situations that present particularly hazardous conditions, a face shield shall be worn in addition to splash goggles.

The use of contact lenses in labs is discouraged; however, if contacts must be worn, splash goggles shall also be worn for added protection.

All types of eye protection used in chemical work, handling, and storage areas shall comply with American National Standards Institute (ANSI) Standard Z87.1-1989.

Skin contact with chemicals shall always be avoided; never smell or taste chemicals.

Long hair and loose clothing shall be confined close to the body.

Sandals, perforated shoes or sneakers, and shorts are prohibited in the laboratory.

Eating, drinking, smoking, chewing gum, taking medications, or applying cosmetics is strictly prohibited in labs. Food and beverage containers should not be stored in areas containing hazardous materials, nor should laboratory water or ice sources be used for human consumption.

Areas of exposed skin shall be washed before leaving the lab.

Pipeting or siphoning by mouth is prohibited.

Practical jokes, horseplay, or other behavior that may startle, confuse, or distract other workers is prohibited in the laboratory.

Work areas shall be cleaned at the end of each work shift or after completion of an operation.

Before beginning any new operation, seek information and advice about potential and real hazards; plan appropriate protective procedures, and positioning of equipment.

Be alert to unsafe conditions and see that they are corrected when detected.

The release of toxins in cold rooms and warm rooms shall not be allowed, as these areas have contained re-circulated atmospheres.

Use only chemicals for which the quality of the ventilation is appropriate.

Use equipment for its intended purposes only.

Storing or handling food or beverages in laboratories or storage areas, or laboratory refrigerators, glassware, or utensils is prohibited.

Regulators approved for the type cylinder and contents shall always be attached prior to opening compressed gas cylinder valves. Adapters are never to be used.

Connections to Compressed Gas Association (CGA) fittings shall never include Teflon tape or other sealing compounds.

Handle and store glassware with care to avoid damage. Do not use damaged glassware.

Use extra care with evacuated glass apparatus - shield or wrap them to contain chemicals and fragments should implosion occur.

When inserting glass tubing into stoppers, always use caution, lubricate the tubing, and protect the hands. When possible, use a glass-a-matic tool to safely insert and remove glass tubing.

Accidents and Spills

A written emergency plan shall be developed for each lab and communicated to all personnel. Each plan should include procedures for ventilation failure, evacuation, medical care, accident reporting, and drills. All accidents and near-accidents shall be recorded and reported to Safety Services for investigation, analysis of gathered data, and reporting of results to all personnel involved.

Personal Contact with Chemicals

Eye Contact: Promptly flush eyes with water for 15 minutes and seek medical attention.

Ingestion: Locate MSDS for specific first aid procedure; inducing vomiting may exacerbate the injury. Seek medical attention.

Inhalation: Remove the person to a source of fresh air. If breathing has stopped, give artificial respiration or CPR if needed. Contact emergency personnel.

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

Spills

Each lab shall develop a spill control procedure that includes prevention, containment, clean up, and reporting.

When any hazardous material is spilled, follow the "Chemical Spill Procedure," you have developed. This procedure is designed to safeguard the health and safety of personnel, as well as facilities and the environment. For small spills that present minimal risk to personal safety, clean up the spill under the laboratory supervisor's guidance and in accordance with instructions in the MSDS.

Label and Hold Waste for Proper Disposal.

If help is needed with a spill that is too large or too hazardous for clean-up by laboratory personnel or others who routinely use the substance, call The Southwest Department of Public Safety at 333-5555 (Union Avenue) 333-4242 (Macon Cove) to request assistance from the Memphis Fire Department or the spill response contractor, or (901) 333-6045 (Maxine A. Smith) to request assistance from the Shelby County Fire Department or Spill Response Controller.

When notifying Public Safety of a spill, report at least the following items:

- Location of the Spill
- Chemical Name (spell it)
- Quantity Released
- When the Spill Occurred
- What Kind of Assistance is Needed
- Your Name and Phone Number

Chemical Releases to the Environment

When spilled hazardous materials enter the soil, sewers, or atmosphere, the release shall be reported immediately to Safety and Health at (901) 333-5459 or Public Safety at (901) 333-5555 (Union Avenue Campus), (901) 333-4242 (Macon Cove Campus), or (901) 333-6045 (Maxine A. Smith Center). Appropriate government agencies will be notified when necessary to comply with environmental regulations. Personnel are urged to block floor drains in areas containing hazardous materials. Temporary drain covers prevent accidental releases into sewers while allowing easy removal for drain use.

Special Precautions

When laboratory procedures require the use of materials classified as select carcinogens, reproductive hazards, highly toxic, or allergens, additional precautions shall be implemented as deemed necessary by the Chemical Hygiene Committee. The permit system shall be utilized for all special activities. All questions regarding the use of the permit system should be addressed to the Chemical Hygiene Officer or department chair.

Designated Areas

Select carcinogens, substances with reproductive hazards, and substances of high acute toxicity shall be used in a "Designated Area" which is clearly marked to warn of potential health hazards.

A Designated Area may be an entire lab, a portion of a lab, or a piece of equipment such as a restricted access fume hood or glove box.

Personnel shall not enter the Designated Area without proper personal protective equipment and training.

Allergens and Embryotoxins

For allergens such as diazomethane, isocyanates, and bichromates, wear suitable gloves to prevent skin contact

Female workers of childbearing age should handle embryotoxins, such as organomercurials, lead compounds, and formamide, only in a hood of confirmed performance and use appropriate protective apparel to prevent skin contact. Where adequate ventilation is not assured, use of respiratory protection is advised.

Review each use of these materials with the laboratory supervisor and review continuing uses annually or whenever a procedure change is made. Notify supervisors of all incidents of exposure or spills, and consult a qualified physician when appropriate under the medical program guidelines.

Store these substances with proper labels in a well-ventilated area in unbreakable secondary containers.

Chemicals of Moderate Chronic or High Acute Toxicity

Lab workers shall minimize exposures to toxic substances such as diisopropyl fluorophosphate, hydrofluoric acid, and hydrogen cyanide by any route using all reasonable precautions. These precautions should include the following:

- Using and storing these substances only in a Designated Area with special warning signs
- Using a hood evaluated within the past year and having a face velocity of at least 100 fpm for procedures that may cause aerosol generation or release vapors containing the substance
- Trapping released vapors to prevent their discharge with the hood exhaust
- Avoiding skin contact by use of gloves, long sleeves, and any other appropriate protective apparel
- Always washing hands and arms immediately after working with these materials
- Maintaining records of the amounts of these materials on hand, amounts used, and names of workers involved
- Being prepared for accidents and spills
- Assuring that at least two people are present at all times if a compound in use is highly toxic or of unknown toxicity
- Storing these substances with proper labels in a well-ventilated area in unbreakable secondary containers
- Working and mounting apparatus above chemically resistant trays or covering work and storage surfaces with removable, absorbent, plastic backed paper
- Evacuating the area and assuring that clean-up personnel wear suitable protective apparel and equipment if a major spill occurs outside the hood, or call Public Safety for assistance
- Decontaminating clothing thoroughly. If possible, decontaminate by chemical conversion.
- Store contaminated waste in closed, suitably labeled, impervious containers. Leather goods soaked with hazardous liquids should be discarded as a matter of routine since decontamination is almost impossible.

Chemicals of High Chronic Toxicity

For substances such as dimethyl mercury, nickel carbonyl or other human carcinogens, or substances with high carcinogenic potency in animals, conduct all transfers and work in a Designated Area.

Prepare a plan for use and disposal of these materials and obtain approval of the lab supervisor. Assure that contingency plans, equipment, and materials are available to minimize exposure from accidents; and after completing the tasks, decontaminate the Designated Area before normal work is resumed there.

Use chemical decontamination whenever possible. Ensure that containers of waste (including washings from contaminated flasks) are transferred from the Designated Area in a secondary container under supervision of authorized personnel.

On leaving the Designated Area, remove any protective apparel and place in appropriately labeled containers. Thoroughly wash hands, forearms, face, and neck.

Protect vacuum pumps against contamination by scrubbers or High-Efficiency Particulate and Aerosol (HEPA) filters and vents them into the hood. Decontaminate vacuum pumps or other contaminated items before removing them from the Designated Area.

Use a wet mop or a vacuum cleaner equipped with a HEPA filter instead of dry sweeping if the toxic substance is a dry powder.

If using significant quantities on a regular basis (3 times a week), consider consulting a physician for medical surveillance.

Keep accurate records of the amounts stored, used, and the dates of use and names of workers.

Assure that the Designated Area is marked with warning and restricted access signs and all containers are properly labeled with identity and warnings.

Store containers only in ventilated, limited access areas in properly labeled, unbreakable, chemically resistant secondary containers.

For a negative pressure glove box, ventilation must be at least 2 volume changes per hour and at least 0.5 inches of water pressure; for a positive pressure box, check well for leaks before each use. Exit gases should be trapped or filtered through a HEPA filter and released into the hood.

Animal Studies

For large-scale animal studies, special facilities with restricted access are preferable.

Administer toxins to animals by injection or gavage, when possible, instead of in the diet. If administering by diet, use a caging system under negative pressure or under laminar airflow directed toward HEPA filters.

Devise procedures that minimize forming and dispersing contaminated aerosols from food, urine, and feces. Use HEPA filtered vacuum equipment for cleaning. Moisten contaminated bedding before removal from cages. Mix diets in closed containers in a hood.

Wear appropriate plastic or rubber gloves, fully buttoned lab coats or jumpsuits, and, if needed, shoe and head coverings and respirators when working in an animal room.

Dispose of contaminated animal tissue and excreta by incineration if it can convert the contaminant to non-toxic products and if permitted by EPA regulations. Otherwise, package waste properly for pick-up by contracted special waste handlers.

Housekeeping, Maintenance, and Inspections

Laboratory floors should be cleaned regularly.

Formal inspections should be held at least quarterly for labs with frequent personnel change and twice a year for others. Informal inspections should be continual.

Eyewashes should be inspected by laboratory personnel on at least a monthly basis, and emergency showers should be inspected and tested at least annually by Physical Plant or Health & Safety. These inspections shall be in accordance with ANSI Z358.1 and manufacturers' specifications, and records shall be maintained to document such inspections and tests.

Other safety equipment should be inspected regularly.

Lock-out/tag-out procedures to prevent restarting out-of-service equipment shall be implemented.

Stairways and hallways shall not be used as storage areas. Aisles, exits, emergency equipment, and utility controls should never be blocked or obstructed in any way.

Records

Accidents are to be reported to the Safety Office by the immediate supervisor of those involved. The Safety Officer will investigate and maintain files of all accident records.

An up-to-date inventory and usage records for high-risk substances shall be maintained and retained by each department.

Inventories of all hazardous materials shall be provided at least annually, and upon significant changes in quantities or types of hazards, to Health & Safety which will maintain these records for at least thirty (30) years.

Employee medical records are confidential and shall be forwarded to the Department of Human Resources for proper filing and retention for the duration of employment plus thirty (30) years.

Records of employee training shall be maintained for thirty (30) years by the department providing training.

Signs and Labels

A properly completed Chemical Spill Procedure shall be posted in each lab and may be used in lieu of a separate posting of phone numbers of emergency personnel, Public Safety, supervisors, and lab workers that should be posted by the telephone.

Identity labels (in plain English) that show the contents of each container and waste receptacle and *the* associated hazards shall be intact and readable.

Signs shall be posted for locations of safety showers, eye-wash stations and other safety and first aid equipment, exits, and areas where food and beverage consumption and storage are permitted.

Refrigerators shall have labels affixed indicating, where appropriate, that flammable liquids are not permitted and that food for human consumption is not permitted.

Fume hoods not specifically designed for perchloric acid shall have a label affixed stating "Not for Perchloric Acid."

Doors to laboratories and storage areas shall be appropriately marked with hazard warnings. Doors should not be propped open.

Warning signs shall be posted at areas or near equipment where special or unusual hazards exist, such as in Designated Areas or where required by regulations.

Waste Disposal

It is the responsibility of the generating department to determine if a waste is hazardous before disposal. No chemical shall be disposed in the building solid waste (trash) or down the drain unless it has been determined to be non-hazardous and acceptable for disposal through these means. In addition, liquids shall not be placed in the building solid waste; liquids are unacceptable in the landfill since they can migrate into the ground water.

Indiscriminate disposal by pouring waste down the drain or adding to mixed refuse for landfill is unacceptable. Hoods shall not be used for disposal of volatiles. Recycling or decontamination of chemical waste should be used when possible.

Do not discharge to the sewer any concentrated acids or bases, any highly toxic, malodorous or lachrymatory substances or anything which may interfere with the biological activity of wastewater treatment plants, create fire or explosion hazards, cause structural damage, or obstruct flow. Consult the "Memphis Sewer Use Ordinance" before discharging anything to the sewer.

Unlabeled containers of chemicals shall be identified before use or disposal. Departments holding unknowns for disposal may be charged analytical fees as well as associated disposal costs.

Once it has been determined that a waste is hazardous, the following shall apply:

- Store the waste by hazard class in closed containers within a secure area where any leak will not cause harm to the environment. **Do not combine different kinds of waste unless you know that they are compatible and are acceptable for disposal in the combined form.**
- Label the waste with the date accumulation started, identity of the constituents, and the words "HAZARDOUS WASTE."
- Schedule removal of the waste by notifying Health & Safety that a pick-up is needed.
- Inspect the hazardous waste on a weekly basis and keep a log showing date and time of each inspection, name of the inspector, observations, and any remedial action taken to correct problems
- Install and maintain emergency equipment to be used in case of a spill.

- Post a Chemical Spill Procedure by the nearest phone and in the storage area. Be certain to designate an emergency coordinator who will respond to any emergency situation involving the waste. Fill in the appropriate phone numbers and other information on the Chemical Spill Procedure.
- Keep complete records of all hazardous waste, including generation date, quantities, and kinds of materials.
- Provide training and proper personal protective equipment for personnel who handle or might otherwise be in proximity to the hazardous waste.

Generating departments shall comply with all applicable hazardous waste regulations, file reports with various regulatory agencies, pay applicable fees, and be prepared to pay disposal costs when appropriate.

Chemicals with a pH less than 5.5 or greater than 10 shall not be introduced into the sanitary sewer.

Neutralize corrosives to acceptable levels before disposal down the drain and be aware of any contaminants such as heavy metals or reaction products which would make the neutralized solution unacceptable for drain disposal.

Potentially infectious items such as cultures, pathogenic waste, human blood and blood products, sharps, and certain body fluids shall be accumulated, handled, and disposed of in accordance with University Infectious Disease Control Plans, the OSHA Bloodborne Pathogens Standard, and related regulations. In order to avoid potential liabilities due to the appearance of improper disposal, all hypodermic needles, syringes, scalpel blades, needles with tubing attached, and significant quantities of culture dishes shall be disposed through the medical waste or other suitable contractor. Sharps shall be accumulated in properly labeled, puncture resistant, leak proof containers.

Assure that the chemical hygiene plan for each lab and protocols for each operation include provisions and training for waste disposal.

Empty Containers

To be legally empty, a container which has held an acutely hazardous waste as defined in state and federal regulations shall be triple rinsed using a solvent capable of removing the chemical contained therein, cleaned by another method that is legally acceptable, or by removing and properly handling any inner liner which prevented contact with the container. Materials rinsed from the container shall be properly handled and disposed.

For other hazardous wastes, all waste must be removed from the container to the extent possible through commonly employed methods of removal for the type of container (e.g., pouring, pumping, etc.).

Since empty containers represent a significant liability, labels and other markings shall be obliterated at the time of disposal. Departments are strongly encouraged to establish procedures to safely break, crush, or puncture empty containers to prevent unwise reuse and reduce the volume of solid waste. Use extreme care in breaking glass and always deposit broken glass in rigid, puncture resistant containers to prevent injury of personnel who will handle the waste. Never use a torch or other spark-producing tool to cut or puncture a metal container that has held a flammable or combustible liquid.

Annual Audit of Plan Effectiveness

This Chemical Hygiene Plan shall be examined annually for effectiveness and modified when appropriate.

