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# EAST TENNESSEE STATE UNIVERSITY

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## Facilities Management

Policy Number: 700.11  
Title: Chemical Hygiene Plan  
Implementation Date: 2002  
Last Audit: May, 2018  
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### Introduction

The U.S. Department of Labor and the Occupational Safety and Health Administration (OSHA) promulgated the final rule (29 CFR 1910.1450) titled Occupational Exposures to Hazardous Chemicals in Laboratories on 31 January 1990. Tennessee Occupational Safety and Health Administration officials have adopted this standard verbatim. This new standard differs from many OSHA health standards in that it does not establish new exposure limits, but sets performance provisions designed to protect laboratory workers from potential hazards in their work environment.

### Purpose

The primary purpose of the East Tennessee State University Chemical Hygiene Plan (CHP) is to protect employees and to reduce the risk of injury from chemical hazards associated with particular laboratories. This is accomplished by establishing responsibilities, policies and procedures for handling hazardous chemicals and through the development and implementation of work practices and control measures expressly tailored to the various laboratories present at the University. Additionally this plan serves as a guide for the various University Divisions as they develop their specific Chemical Hygiene Plans.

### Definitions

**Chemical Hygiene Officer** - The designated employee 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 which sets forth policy and procedures to protect employees from the health hazards associated with their work place.

**Combustible liquid** - Any liquid having a flashpoint at or above 100 degrees Fahrenheit (F).

**Compressed gas** - A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 degrees F, or a gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 degrees F regardless of the pressure at 70 degrees F, or a liquid having a vapor pressure exceeding 40 psi at 100 degrees F as determined by ASTM D-323-72.

**Employee** - An individual employed to work in a laboratory who may be exposed to hazardous chemicals in the course of their employment.

**Explosive** - A chemical that causes a sudden, almost instantaneous release of pressure, gas and heat when subjected to sudden shock, pressure or high temperature.

**Flammable liquid** - A liquid having a flash point below 100 degree F, except any mixture having components with flash points of 100 F or higher, the total of which make up 99 percent or more of the total volume of the mixture.

**Flammable solid** - A solid other than a blasting agent or explosive that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns vigorously and persistently as to create a serious hazard. A chemical that ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis when tested by the method described in 16 CFR 1500.44.

**Glove box**- A sealed, protectively lined compartment, having ports to which are attached gloves for use in handling materials inside the compartment

**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 an exposed employee. This includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic (blood-forming) systems, and agents which can damage the lungs, skin, eyes or mucous membranes.

**High Risk Operations** - Experimental procedures involving the manipulation, handling or reaction of hazardous chemicals where the potential for release of gas, vapor or aerosol contamination is high. This category includes but is not limited to (i) rapid exothermic reactions, (ii) transfer of electrostatic powders, (iii) heating, mixing or transfer of volatile chemicals, (iv) pressurized operations where there is potential for uncontrolled release, and (v) work involving aerosol generation.

**Laboratory** - A facility or individual room where the "laboratory use" of hazardous chemicals occurs.

**Laboratory hood** - A type of engineering control enclosed on five sides with a movable sash or fixed partial enclosure on the remaining side designed to draw air from the laboratory into the enclosure to prevent or minimize the escape of contaminants into the laboratory space.

**Laboratory scale** - Work with substances in which the equipment used for reactions, transfers, and other handling are designed to be easily and safely manipulated by one person.

**Oxidizer** - A chemical other than a blasting agent or explosive as defined in Title 29 CFR, part 1910.109 (a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

**Universal Precautions** – Universal precautions is an approach to infection control to treat all human blood and certain human body fluids as if they were known to be infectious for HIV, HBV and other bloodborne pathogens.

### **Responsibilities**

- **Environmental Health and Safety Office (EH&S)**
  - Develop and maintain this written university wide plan.
  - Monitor department compliance with the program by annually reviewing the chemical hygiene plans of each applicable department.
  - Provide guidance and technical assistance to departments in the implementation and maintenance of the program.
  - Assist departments in fulfilling their training requirements.
  - Provide guidance and assistance with hazardous waste handling, storage and disposal.
  - Approve departmental procurement of chemicals to ensure that the appropriate engineering controls are available for the chemicals being purchased through eBucs.
- **Departments that Have Laboratories**
  - Appoint a Chemical Hygiene Officer (OSHA Coordinator) to facilitate implementation of this Program.
  - Ensure all necessary personal protective equipment has been provided.

- Ensure necessary and required training is provided to potentially exposed employees.
- Monitor and enforce compliance with Universal Precautions.
- **Departmental Chemical Hygiene Officers**
- Perform surveys to insure laboratories are in compliance with this program.
  - Ensure new employees are oriented to this standard when initially hired.
  - Maintain all departmental records required by the program.
  - Review the Departmental Chemical Hygiene Plan annually and revise as needed. Review must be documented in writing. Documentation may be as simple as writing and signing a statement on the cover page stating that the annual review has been performed.
  - Ensure appropriate personal protective equipment is worn by all laboratory personnel and visitors.
  - Ensure all Hazardous Waste containers are appropriately labeled.
- **Employees, Students and Other Potentially Exposed Individuals**
  - Understand and comply with the provisions of this Program and the protection afforded by the OSHA standard.
  - Notify your departmental, "OSHA Coordinator" or other University official of activities, which present potential exposure concerns.
  - Be aware of engineering controls and the proper use of those controls. Follow established controls to eliminate or minimize potential exposure.
  - Be aware of the proper use, limitations and location of available personal protective equipment. Use appropriate personal protective equipment to eliminate or minimize potential exposure.
  - Be aware of and observe established housekeeping procedures, e.g. use of mechanical devices to clean up broken glass in lieu of using bare hands. Maintain work area in a clean and sanitary manner.
  - Complete all required training.
  - Make certain that all containers have appropriate warning labels.

## **Methods of Compliance**

- **Procurement.**

- Purchase requests for chemicals shall include a request for the supplier to provide a copy of any applicable SDS to the EH&S Office. Personnel should order the smallest quantity necessary to complete the work.
- Personnel who initiate purchase requests should review health and safety data on chemicals prior to ordering to determine any special requirements for handling, storage or disposal.
- Safety Data Sheets (SDS) for chemicals used at ETSU are available through the Health and Safety Office or through MSDS Online.
- Containers should be inspected upon receipt to ensure they are intact and not leaking. Damaged or unlabeled containers shall not be accepted.

- **Chemical Storage.**

- Chemical storage inside the laboratory should be limited to those chemicals necessary for work in progress. Central storerooms shall be used when they are available. Chemicals should not be stored on the bench. Open shelves should be designed with a restraining device or lip to prevent containers from creeping or tipping over.
- Chemicals shall be stored according to the compatibility categories. Chemicals within a given storage group may be incompatible with other chemicals in that group. Spill trays should be used to reduce commingling in the event of spills or leaks.
- Chemicals shall be inspected at least semiannually to determine their condition. Corroded or leaking containers should be turned in as hazardous waste.
- Cabinets and storage areas shall be labeled.

- **MSDS Online Program.**

- The MSDS Online Program is managed by ETSU's Environmental Health & Safety Office (EH&S). EH&S will add all new or updated Safety Data Sheets (SDS) to the database as each department purchases new chemicals.
- This program is available 24 hours a day, 7 days a week and can be easily accessed when the internet is available. Hard copies are available through EH&S at 439-6028.

- Additionally, the university's procurement system automatically flags chemical purchases. No chemicals are approved through this procurement system without review/approval by EH&S.

- **Flammable and Combustible Liquids.**

If the lab has a sprinkler system, no more than 5 gallons of flammable and combustible liquids, combined, should be stored outside of a flammable storage cabinet. If the lab does not have a sprinkler system, no more than 2 gallons should be stored outside of a flammable storage cabinet.

- Flammable and combustible liquids shall be stored in glass, metal or plastic containers which meet the requirements of NFPA 30. Flammable liquids shall be stored in approved safety cans when the container quantity exceeds 2 gallons. Combustible liquids shall be stored in approved safety cans when the container quantity exceeds 5 gallons (NFPA 45).
- Flammable and combustible liquids shall be stored in approved cabinets designed in accordance with NFPA 30. Cabinets should not be located adjacent to an exit or in a stairwell.
- The transfer of flammable liquids to smaller containers from bulk containers not exceeding 5 gallons shall be conducted in a chemical fume hood or in an approved inside chemical storage room.
- Flammable liquids shall not be transferred between metal containers unless the containers are electrically bonded.
- Refrigerators and freezers used to store flammable liquids shall be explosion-proof or "laboratory safe" in accordance with NFPA 45.

- **Water Reactive and Shock Sensitive Chemicals.**

- Water reactive chemicals shall be segregated from other chemical storage. These chemicals should be stored in approved cabinets. If approved cabinets are not available, containers should be over packed in a metal can during storage.
- Water reactive chemicals shall not be stored with flammable or combustible liquids.
- Shock sensitive and peroxide forming chemicals, if expired, should be disposed of by EH&S personnel.

- **Compressed Gases.**

- Gas cylinders shall be labeled or tagged to show their contents.
- Gas cylinders shall be secured by the use of clamps, chains, straps, or otherwise restrained while in storage or use.
- When gas cylinders are in storage, hand valves shall be tightly closed and the valve protector cap shall be in place.
- Compressed gas from cylinders shall be reduced through the use of a regulator specifically designed for that purpose.
- Reduction valves, gauges and fittings used for oxygen shall not be used for other gases. Likewise valves, gauges and fittings used for other gases shall not be used for oxygen.
- Compressed gas cylinders shall be moved using a suitable hand truck. The gas cylinder shall be strapped in place with the valve protector cap installed. Only one cylinder shall be moved at a time.

- **Transporting Chemicals.**

- Toxic, flammable or corrosive chemicals should be placed in a carrying bucket or other unbreakable container when moved between rooms or through the laboratory corridors.
- Wheeled carts should be used to move larger quantities of chemicals which cannot be hand carried. Carts with open shelves should be designed with a restraining device or lip to prevent containers from creeping or tipping over.

- **Engineering Controls.**

- Engineering controls including hoods, glove boxes, inhalation chambers, gas cabinets, local exhaust ventilation and substitution of less toxic chemicals should be used to minimize exposure to all hazardous chemicals in the laboratory.
- Laboratory operations shall be planned and conducted using appropriate engineering controls. High risk operations shall be conducted inside primary containment including chemical hoods, glove boxes or inhalation chambers.

- **Chemical Exhaust Hoods.**

- Hoods shall have an average face velocity of 90 feet per minute (fpm) or greater with the sash in the full open position. Hoods used for radioactive materials shall have an average face velocity of 100 feet per minute (fpm) or greater. Sash stops should be installed when the face velocity requirement cannot be met with the sash in the full open position.
- Hood performance will be evaluated annually by EH&S and after any repair or modification.

- **Glove boxes.**

- Glove boxes shall be visually inspected prior to any work.
- Maximum life of gloves are 10 years from the documented date stamped from the manufacturer.
- If gloves are changed out for any reason, it must be documented (date, manufacturer and model, and the person doing the change out).
- Glove box performance shall be evaluated annually, and after any repair or modification to the ventilation system.

- **Administrative & Work Practice Controls.**

- Working quantities of hazardous chemicals outside of storage during an operation shall be as small as practical. Containers shall be closed when not in use.
- Mouth pipetting is prohibited.
- Handle and store laboratory glassware with care to avoid damage. Damaged glassware should not be used.
- Glassware used for pressure or vacuum service shall be designed specifically for that purpose.
- Work with the hood sash closed as much as possible during the operation.
- Keep all apparatus and containers at least 6 inches behind the hood face to minimize spillage from the hood.
- Minimize the storage of chemicals or hazardous waste inside the hood. Use approved cabinet or satellite storage locations.

- If the hood sash is supposed to be partially closed for operation, the hood should be so labeled and the appropriate closure point clearly marked.

- **Personal Protective Equipment**

- PPE shall be provided, laundered or disposed of at no cost to the employee.
- All personal protective equipment shall be repaired or replaced as needed.
- All personal protective clothing shall be removed prior to leaving the work area.
- Disposable gloves shall be replaced as soon as practical when contaminated or as soon as feasible if they are torn, punctured or when their ability to function as a barrier is compromised.
- Gloves shall be of appropriate materials, intact latex or intact vinyl of appropriate quality for the procedures performed and of appropriate size for each wearer. Hands are to be washed using warm water and liquid soap immediately after removing gloves.
- No gloves shall be used if they are peeling, cracking or discolored or if they have punctures, tears or other evidence of deterioration.

**Approved by:** \_\_\_\_\_  
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**Date approved:** \_\_\_\_\_

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