Procedure No 400.11
Subject: Chemical Hygiene Plan
Reference: CFR1910.1200; 1910.1450 & NFPA 45 Implementation Date: 2002
Distribution All Employees Review Date: July 2008

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.

Policy Statement

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.

Anyone having questions concerning this Plan may contact the Health and Safety Office, 439-6028.

This Plan also mandates practices and procedures for post-exposure follow-up and recordkeeping.

Specific requirements of this Plan include:

- Designation of Departmental Chemical Hygiene Officers.
- Development of Standard Operating Procedures

Responsibilities

- **Environmental Health and Safety Office**
  - Develop and maintain this written university wide Plan and perform annual reviews.
  - Monitor department compliance with the Program.
  - Provide guidance and technical assistance to departments in the implementation of the program.
  - Assist departments in fulfilling their training requirements.
  - Provide guidance and assistance with hazardous waste handling, storage and disposal.
- **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 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 mechanical devices to clean up broken glass in lieu of using bare hands. Maintain work area in a clean and sanitary manner.

  - Attend 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 MSDS 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.

  - Material Safety Data Sheets (MSDS) for chemicals used at E.T.S.U. are available through the Health and Safety Office.

  - Containers should be inspected upon receipt to ensure they are intact and not leaking. Damaged or unlabelled 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.

- **Hazardous Chemical List.**

  - The hazardous chemical list should include:

    - "Chemical Name".
    - CAS numbers for hazardous ingredient (s) (if available).
    - Permissible exposure limit/threshold limit value.
    - Physical hazards.
    - Health hazards - signs and symptoms of overexposure.
    - Approximate amount of chemical present (optional).

  - This list should be available at each workplace and cover only those chemicals used in that specific workplace. A master list should be kept by the CHO.

- **Flammable and Combustible Liquids.**

  - The quantity of flammable and combustible liquids stored in a laboratory room shall not exceed 60 gallons. The quantity of liquids stored in an approved inside storage room shall be in accordance with NFPA 30.

  - 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 hood or in an approved inside 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 unopened should be turned in after 12 months of storage. Once opened, they should be turned in as hazardous waste, after 6 months of storage.

- **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.

- Gas cylinders shall not be stored in the laboratory. The number of cylinders should be limited to the number necessary to complete work in progress.

- 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 to 120 feet per minute (fpm) with the sash in the full open position. 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.

  - Hoods used for toxic compounds, carcinogens or reproductive toxins shall be evaluated on a monthly basis by the CHO or their designated representative.

- **Glove boxes.**

- Glove boxes shall be maintained at a negative pressure of at least 0.25 inches water gauge. A manometer or magnehelic gauge shall be installed to monitor differential pressure.

- Glove boxes shall have an inward velocity of at least 50 fpm through all open ports or doors. Total makeup air volume shall be adequate to prevent explosive concentrations of gas, vapor or dust inside the enclosure.

- 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.

  - Standard Operating Procedures shall be prepared for each laboratory operation using hazardous chemicals. SOPs shall be approved by the CHO.

  - 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 of if they have punctures, tears or other evidence of deterioration.

APPENDIX 1

EXPLANATION OF TERMS

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 capable of protecting 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 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.

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.