TEXAS SOUTHERN UNIVERSITY

# CHEMICAL HYGIENE AND LABORATORY SAFETY HAZARD COMMUNICATION MANUAL

**Building:** _____ **Unit or Dept:** _____ **Room:** _____

**Principle Investigator:** _____

**Phone** _____ **E-mail** _____

**Supervisor-in-Charge:** _____

**Phone** _____ **E-mail** _____

Department of Environmental Health and Safety & Office of Research Enhancement & Compliance Services
July 2019

# EMERGENCY ASSISTANCE -- Fire, Ambulance, Police
# From On-Campus Phone ---7000/7001
# From Off-Campus Phone --- (713) 313-7000/7001

| Non-Emergency Assistance - External Agencies | |
|---|---|
| **Dial "9", then the number listed** | |
| Houston - Fire | 713-837-0311 |
| Houston - Police | 713-247-4400 |
| Houston - Ambulance | 911 |
| Harris County Sheriff | 713-221-6000 |
| National Poison Control Center | 1-800-222-1222 |
| Texas Department of Public Safety (Tx DPS) | 1-281-517-1200 |
| FBI | 713-936-7000 |
| Crime Stoppers | 713-521-4600 |
| Hospital (Concentra) | 713-223-0838 |

| Non-Emergency Assistance - Campus Contacts | | |
|---|---|---|
| **Contact Name** | **Campus Extension** | **External Number (Dial "9", then the number)** |
| University Police | 7000 / 7001 | 713-313-7000 / 7001 |
| TSU Safety Officers | | |
| - | | |
| - Fred Holts | 1921 | 281-804-8420 |
| - Darnell Johnson, III (IH/RSO) | 1336 | 702-205-1864 |
| General Information & Spill Assistance Response | | |
| - Physical Plant (Maintenance) | | |
| - Physical Plant (Non-Business Hrs) | | |

# FOREWORD

This Manual is intended to provide structure and guidance for both teaching and research laboratories in complying with the Texas Hazard Communication Act (THCA) and the TSU Hazard Communication Program (TSU HazCom). The TSU HazCom Program describes how TSU complies with the THCA.

Research laboratories may be exempted from certain labeling, inventory and reporting requirements (see below).

## IMPORTANT DEFINITIONS

- **"Act"** refers to the Texas Hazard Communication Act (THCA)
- **Employee:** A person (including students) who is on the payroll of TSU, TSU or a TSUS Agency and who may be exposed to hazardous chemicals in the workplace under ***normal*** working conditions or ***foreseeable*** emergency. Employees (e.g. secretaries, office workers) whose employment does not include routine exposure to hazardous chemicals are not covered by the Texas Hazard Communication Act (THCA). THCA regulations also do not apply to students who are not employed by TSU or a TSU Agency.
- **Precursor Chemicals:** The Texas Higher Education Coordinating Board and the Texas Department of Public Safety developed a Memorandum of Understanding intended to prevent diversion of equipment and chemicals from academic labs to the production of illicit drugs. The specific precursor compounds are in Appendix B.
- The **TSU Hazard Communication (HazCom) Program** describes the procedures whereby the University complies with the Act.
- **Research Laboratory**: A laboratory that engages in only research or quality control operations. Chemical specialty product manufacturing laboratories, full scale pilot plant operations laboratories that produce products for sale, and service laboratories are not research laboratories. *Chemical storerooms (unless accessible only through a research laboratory) and teaching labs are NOT research laboratories.*
  **NOTE**: Academic research laboratories are exempted from some of the requirements of the Texas Hazard Communication Act **if** the following conditions are met.
  - The use of hazardous chemicals is under the direct supervision or guidance of a technically qualified individual;
  - Personnel training requirements (described below) are fulfilled;
  - Labels on incoming containers of chemicals are not removed or defaced;
  - The contents of secondary containers should be identified.
  - SDS access requirements are satisfied;
- **Technically Qualified Individual:** An individual with a professional education and background working in the research or medical fields, such as a physician, a registered nurse, or a person holding a college bachelor's degree in science.
- **Workplace:** *Usually* a single building (e.g., Classroom Lab Building) or complex of buildings where similar work activities are conducted. The Safety Officer designates workplaces at TSU.
- **Work Area:** Room, lab or defined space within a workplace where hazardous chemicals are present, produced, used, or stored and where employees are present.

**The <u>TEXAS SOUTHERN UNIVERSITY HAZARD COMMUNICATION PROGRAM</u>** includes the following required components. *See GUIDE TO REGULATORY COMPLIANCE FOR RESEARCH LABORATORIES (Below*)

- **<u>Written Programs and Preparedness Plans</u>**
  - **Workplace Preparedness Plan** Each *workplace* must have a written plan that describes how the TSU Hazard Communication Program is implemented in that workplace. Attachment I is to be completed by the designated department official, not by each Principle Investigator or Supervisor. A copy of the *Workplace Preparedness Plan* for your department or building should be available in your department office. For Workplace Preparedness Plans, it would be advisable to keep copies of each *Work Area Preparedness Plan* form within the designated workplace.
  - **Work Area Preparedness Plan** Each *work area* should have its own Preparedness plan. This can be accomplished by completing Part I of this Manual for your research laboratory. <u>In order to assure compliance, users should not alter the actual text</u>.
  - **Note:** There are instances in which granting agencies require grantees to have a Chemical Hygiene Plan (as specified by the OSHA Lab Standard) in place. The THCA does not include a lab standard component. However, the completed Chemical Safety Manual fulfills the requirements of the OSHA Lab Standard.
- **<u>Hazardous Chemical Inventory</u>**
- Inventory requirements generally apply to quantities of 50 gallons or 500 pounds. *Thus inventory of most chemicals in research laboratories is not required.* (See "Research Laboratory Exemptions" above).
- **<u>Labeling Of Hazardous Materials</u>**
- Containers must be fully labeled; Access to Safety Data Sheets (SDS).
- Employees must have access, within one work shift, to SDSs.
- **<u>Employee Information And Training</u>**
  - Employee training is a major requirement of the THCA. Employees must be provided two levels of training: General and Specific. The <u>General Training</u> requirement can be satisfied by completion of (a) the TSU Safety Office Introduction to Laboratory Safety Training Course or (b) the TSU Human Resources HazCom Training Course, or (c) as provided and documented by the supervisor.
  - Employees must be provided training before potential exposure to hazardous chemicals and when a new hazard, or significantly increased hazard is introduced into the work area. There is no requirement to repeat General Training.
- Forms to facilitate documentation of employee training are included in Attachment II. Once this manual is completed by the supervisor, *<u>Work Area Specific Training</u> can be accomplished by reading the Chemical Safety Manual, applicable Safety Data Sheets and understanding the information provided.*
- **<u>Record Keeping</u>**
  - Training records must be maintained for 5 years. Workplace inventory records are maintained by each lab with a copy maintained on file with the TSU Director of Safety.
  - Certification of completion of required training should be reported as required within the Workplace.

# GUIDE TO REGULATORY COMPLIANCE FOR RESEARCH LABORATORIES

The "Hazard Communication and Chemical Safety Manual" is intended to provide a simple means for Research Laboratory Supervisors to assure that their unit is in compliance with the Hazard Communication regulations; the TSU Hazardous Waste Program; and the Texas DPS requirements regarding Controlled Laboratory Apparatus and Chemicals.

## PART 1. BASIC REQUIREMENTS

Step 1 Obtain a copy of the "Workplace Preparedness Plan" and attach it to this document as "Attachment A."

Step 2. Fill in the blanks on pp. 1 and 2 to prepare a "Work Area Preparedness Plan."
This provides the location of employee training records, how/where to locate/access safety information, etc. Suggest preparing a simple diagram of the lab (Work Area) that shows where these are located.

Step 3. The item on p. 3 refers to a "Memorandum of Understanding" that on Laboratory Apparatus and Chemicals. This is a plan to prevent diversion of laboratory equipment and chemicals to an illicit drug operation. Post the "IMPORTANT NOTICE" (p. 31) in the Work Area and make employees aware of the context of the Memorandum of Understanding.

Step 4. Inform and Train Employees
Employees must be provided Hazard Communication information and training BEFORE they have potential exposure to hazardous materials. Supervisors are responsible for assuring that these requirements are fulfilled. Training requirements include:

a. Information about the **TSU** HazCom Program. New employees receive this as part of their Orientation. Other employees can be provided this by completing the on-line course titled "Introduction to Laboratory Safety" (3 hour). There is no requirement to repeat this training. Employees must be provided general and specific information and training on the hazardous materials to which they might be exposed.

   General Laboratory Safety Training must include items 1 - 5 in Attachment II. Training must include knowledge and understanding of the information in Part III, “Working with Hazardous Laboratory Chemicals”, and Appendix C (TSU Hazardous Waste Program) of the Manual. Completion of the "Introduction to Laboratory Safety" course on-line satisfies this requirement. There is no requirement to repeat this training.

   Specific Training must include items 6 - 9 in Attachment II. This training is specific to the hazardous materials and conditions in the employee's work area. Specific training is required when a new hazardous material is introduced, or if a current hazard is significantly increased in the work area. Chemical-specific training can be accomplished if the employee reads and understands the SDS and/or other appropriate safety/hazard information. Suggest attaching a copy of the SDS, etc to the Manual. The supervisor is responsible for providing Specific Training.

b. Employee Training Records should be maintained in the Department Personnel and as an attachment to the Manual (optional).

## LABORATORY SAFETY RULES AND PROCEDURES Optional

Part IV of the Manual provides a series of safety rules and other laboratory safety topics. It is designed to be customized to fit the needs of your laboratory / work area. Suggest attaching a copy of procedures / protocols that are used in your laboratory... All text documents are in Microsoft Word to enable “fill-in-the-blank” sections to be completed.

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For information or comments concerning content, please contact Darnell Johnson (713) 313-1336 or Fredrick Holts (713) 313-1921 the Director of Safety for Texas Southern University and editor of this TSU document created by Dr. Donald E. Clark.

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# PART I. WORK AREA HAZARD COMMUNICATION PREPAREDNESS PLAN

This Plan includes information and records to document compliance of this laboratory with the TSU Hazard Communication Program (TSU HazCom) and the Workplace Preparedness Plan. Copies of these documents should be attached. The TSU HazCom can be obtained from Environmental Health and Safety Department. To assure compliance with the TSU HazCom, the following documentation must be available:

- Workplace Preparedness Plan *[a blank copy is in Attachment I.)* Attach a completed form to the Manual.
- Work Area Preparedness Plan *[complete Part I of this Manual]*
- Completed record of training *[complete a separate form for each employee from Attachment II]*
- A copy of the most current version of the TSU HazCom Program *[attach copy, available from EHSD Website]*

**Note:** Although not required by the Texas Hazard Communication Act, Instructors are responsible for providing appropriate safety information and direction to students (non-employees) enrolled in laboratory classes if class work involves hazardous chemicals. Non-employee record keeping is not required.

**Location of Personnel Training Records** _____
Training records are maintained for at least five years
**Location and Access to Hazard and Safety Information**

Access to SDSs and other information on hazardous materials is available from the Environmental Health and Safety Department (713) 313-1048 and through this link (SDS). Click on "SDS" and follow the instructions. After-hour access to SDS is available through the TSU Safety Office Homepage.

**Location of Laboratory SDS File:** _____
**Location of Computer for accessing SDS Files:** _____
**Location of Department SDS Files:** _____

**Diagram Of Work Area (See Attachment III)**

**Diagram should show the location of the following:**
- Personal protective equipment and supplies
- Hazardous materials and equipment (e.g. lasers,
- First aid and emergency equipment and supplies

**HAZARD WARNING SIGNS**

Warning signs (e.g. radioactivity hazards, biological hazards, fire hazards, and laser operations) are appropriately posted in laboratory areas with special or unusual hazards. Other signs are posted to show the locations of safety showers, eyewash stations, exits, and fire extinguishers. Hazardous waste containers must be properly labeled.

**Location of Hazard Warning Signage: *[Complete the following]***
- Location of Emergency Information and Evacuation Plan**:** _____
- Postings for Exits and emergency equipment_____
- Warning signs posted at areas or equipment where special or unusual hazards exist _____
- Posting of areas where food / beverage preparation, consumption and storage are (or are not) permitted.
  _____
- Other signage: _____

***[Complete the Following, if Appropriate]***

**Unusual abbreviations, codes, symbols, nomenclature etc used in this lab to identify hazardous materials.**

_____
_____

**Labeling Hazardous Chemicals**

Each primary container (as received from the supplier) must be fully labeled. The label must include the following:

- Name and address of the manufacturer
- Identity of the contents (Must be the same as appears on the SDS).
- Physical and health hazards, including target organs.

Missing or illegible labels must be replaced.

Complete labeling of each secondary container in research laboratories is not required. However, the contents of secondary containers must be marked so that they are readily identifiable by persons not associated with the lab (e.g., emergency or spill responders).

**Work Area Chemical Inventory** (Recommended)
**Work Area Para A**

**Chemical Hygiene**

1. Mouth pipetting is prohibited; use a pipet bulb or an aspirator.
2. Wash potentially exposed skin surface frequently, and before leaving the laboratory area. *(Do not use solvents for washing the skin. They remove the natural protective oils from the skin and can cause irritation and inflammation, and may facilitate absorption of a toxic chemical.)*
3. Confine long hair and loose clothing when in the laboratory.
4. Avoid exposure to gases, vapors, and aerosols.
5. Shorts and open toed shoes should not be worn in the lab unless covered by protective clothing.

**Food and Drinks in the Laboratory**

Contamination of food, drink, and tobacco products are potential routes for oral exposure to toxic substances. Food and beverages may be stored, handled, and consumed ONLY in an area that is designated to be free of potentially toxic substances. Do not use laboratory chemicals (e.g., NaCl, sugar), glassware or equipment for storage, preparation, or use of materials intended for human consumption.

Do not bring food or drinks or use tobacco products or apply cosmetics in laboratories, or other areas where radioactive, or hazardous biological or chemical materials are present. Do not store, use or dispose of consumable items in laboratories (including refrigerators within laboratories). Rooms that are adjacent, but separated by floor to ceiling walls, and where hazardous substances are not present, may be used for these activities at the discretion of the supervisor responsible for the area(s). Do not use laboratory ice for human consumption.

Location where storage, preparation and consumption of food, drinks etc ARE, or ARE NOT permitted are indicated in the Laboratory Diagram (Attachment III).

**Personal Protective Equipment (PPE)**

Laboratory employees must be furnished appropriate personal protective equipment (PPE) if potential exposure cannot be effectively controlled by engineering and administrative controls. Consult the SDS for the chemical or contact the TSU Safety Department for assistance with PPE selection.

1. Appropriate eye protection MUST ALWAYS be worn anytime there is a risk of injury from chemical contact or airborne dust, particle or penetrating objects. Additional eye and face protection should be worn, as needed (e.g., radiation, laser). Contact lens may be worn in the lab. However, contact lens and normal corrective glasses cannot be a substitute for wearing other personal eye protective equipment.
2. Use protective apparel, including face shields, gloves, and other special clothing or footwear as needed. Do not wear potentially contaminated protective clothing outside the lab area. Clean lab coats regularly (special washing may be required). Do not wash contaminated lab clothing with other clothing. Treat contaminated disposable clothing as hazardous waste.
3. Equipment for protection of the respiratory system, skin and clothing must be provided and should be worn as appropriate. Assurance of proper fit is required whenever the use of respiratory protective equipment is necessary. Contact the TSU Safety Department prior to wearing a respirator.

**Personal Protective Equipment is required as follows.** _____

_____

**Chemical Fume Hoods**

Use the hood for all operations that might result in release of flammable, toxic or malodorous chemical vapors or dust. A hood or other local ventilation device must be used when working with any air-borne substance with a permissible concentration in air of less than 50 ppm.

1. Confirm adequate hood performance before use.
2. The fume hood sash should be kept closed at all times except when necessary for manipulations within the hood.
3. Minimize storage of materials in the hood.
4. Do not use a fume hood for long-term storage of chemicals or equipment.
5. Do not allow blockage of vents or disruption of airflow.
6. Leave the hood "ON" if volatile or toxic substances are stored or if needed to assure adequate general laboratory ventilation.
7. Place equipment and other materials at least six inches behind the sash to assure proper airflow and to reduce the escape of chemical vapors into the lab.
8. Raise large equipment ~1.5 inches off the work surface to allow air to flow underneath.
9. Do not allow loose papers, paper towels, or tissues (e.g., Kimwipes®) to be drawn into the exhaust duct.
10. Do not place objects in front of a fume hood (such as refrigerators or lab coats hanging on the manual controls) that might interfere with airflow.
11. See "*Strategies for Minimizing Exposure to Hazardous Chemicals*; See Table 4 *"Health Hazard Rating: Acute Toxicity*

**DO NOT install, remove, relocate or modify any hood or exhaust system without prior approval of the TSU Safety Office.**

**Chemical Storage**

1. Store chemicals by hazard class. Maintain adequate separation of incompatible chemicals.
2. Store flammable solvents and strong acids or bases separately and in appropriate cabinets.
3. Secure compressed gas cylinders (strap, chain or cylinder stand).
4. All stored chemicals must be in appropriate containers, tightly sealed, properly labeled, and in good condition.
5. Flammable materials must not be stored in refrigerated equipment, unless the refrigerator is specifically designed for that purpose.

**Hazardous Waste**

1. Become familiar with, and carefully follow the instructions in **APPENDIX BC**
2. Containers used for collection of hazardous waste must be in good condition, must not leak, and must remain closed except when waste is added. Containers and contents must be compatible. Do not overfill hazardous waste containers (Allow at least 10% headspace for liquid expansion).
3. Triple rinse, deface the labels, and remove lids before disposing of empty containers
4. Do not combine incompatible chemical waste. (Call EHSD for information).
5. Hazardous waste containers must be properly labeled. All components must be identified on the label (for example, 10% ethanol, 10% xylene, 80% water) and label as “Hazardous Waste”.
6. Do not dispose of hazardous chemicals by disposal down the drain, intentional evaporation or disposal in the regular trash.
7. When a container is ready for disposal, attach a completed Safety Office hazardous waste tag to the container. (Specify location for storage of hazardous chemical waste awaiting disposal). Complete the electronic request for pickup of hazardous waste located on the Safety Department home page.

**Spills**

Every lab should have immediate access to equipment and supplies to cleanup the largest container of every type of hazardous material in the work area.

In the event of a *small, contained spill** and/or until assistance from the EHSD is obtained, follow these steps:

1. If the substance is dry and/or nonvolatile, shut off hoods, close windows and doors, and vacate rooms. Label door with appropriate warning. Allow the aerosol to settle for about 30 minutes before reentering room.
2. If the substance is volatile, leave ventilation on and vacate room. Close the door and post warning.
3. Notify the laboratory supervisor.
4. Assemble materials necessary for decontamination and don appropriate protective clothing, i.e., disposable lab coat, gloves and splash goggles. If respiratory protection is needed, seek assistance from supervisor or the TSU Safety Office.
5. For a liquid carcinogen or other hazardous chemical spill, wipe up the spill with absorbent material. Wash down all surfaces with the decontaminating solution appropriate to the nature of the material.
6. For a dry chemical or biological spill, wash down all surfaces with an appropriate solvent to neutralize or deactivate and remove the substance.
7. Place all contaminated materials in impermeable containers and seal. Properly remove and bag protective clothing and follow appropriate disposal procedures.

**A small contained spill of hazardous material is one that can be managed by a single person who, when wearing proper PPE, will not encounter excessive exposure, other hazardous condition (e.g. fire, explosion) or release of highly odoriferous or noxious materials. Any other spill is a "large spill" requiring notification of the Houston Fire Department and University Police.*

**Housekeeping in the Laboratory**

There is a definite relationship between safety performance and orderliness in the laboratory. Lab personnel are individually and collectively responsible for maintaining the work area in a clean and orderly fashion.

1. Keep work areas clean and free from obstructions. Hallways, corridors, aisles and exit routes must ALWAYS be kept clear and free of obstructions. Do not allow emergency equipment, electrical panels, and such to be blocked. Do not use hallways or stairways for storage.
2. Cleanup should follow the completion of any operation or at the end of each day.
3. Clean and dispose of spilled chemical and cleanup waste promptly and properly.
4. Dispose of unneeded chemicals, empty containers, etc. Do not allow unneeded items to accumulate and create clutter.
5. Floors should be cleaned regularly. Accumulated dust, chromatography adsorbents, and other powdered chemicals and materials may pose respiratory hazards.
6. Store equipment and chemicals properly; minimize clutter.

**Facility and Equipment Maintenance**

Good equipment maintenance is important for safe, efficient operations. Equipment should be inspected and maintained regularly. The risk and the consequences of failure should determine servicing schedules. DO NOT ATTEMPT TO USE EQUIPMENT KNOWN TO BE FAULTY.

1. Use equipment only as it was intended. Follow the manufacturer's instruction manual closely. Do not deactivate or defeat safety devices.
2. Inform the supervisor of equipment malfunctions or unsafe conditions.
3. Contact Physical Plant, Area Maintenance ***[Add your Area Maintenance Group's Number]*** (___-__ _____*)* promptly in case of utility or building equipment failure.
4. Contact the Safety Office or Physical Plant for information or assistance regarding fume hood or local exhaust operation or testing.

**Guarding and Shielding for Safety**

All mechanical equipment should be furnished with guards that prevent access to electrical connections or moving parts (such as the belts and pulleys of a vacuum pump). Inspect equipment before use to ensure that the guards are in place and functioning.

Use safety shielding for any operation having the potential for implosion or explosion such as:

1. when a reaction is attempted for the first time (small quantities of reactants should be used to minimize hazards);
2. whenever a familiar reaction is carried out on a larger than usual scale (e.g., 5-10 times more material);
3. whenever operations are carried out under non-ambient conditions. Locate shields such that all personnel in the area are protected from the hazard.

**Laboratory Glassware**

Accidents involving glassware are a leading cause of laboratory injuries.

1. Use care in handling and storage procedures to avoid damaging glassware. Damaged items should be discarded or repaired.
2. Use appropriate hand-protection when inserting glass tubing into rubber stoppers or corks, or when placing rubber tubing on glass hose connections. Tubing should be fire polished or rounded and lubricated. Hold hands close together to limit movement of glass should a fracture occur. Use plastic or metal connectors (instead of glass connectors) when possible.
3. Handle vacuum-jacketed glass apparatus with extreme care to prevent implosions. Tape or shield equipment such as Dewar flasks.
4. Use heavy-walled, silica glassware (Pyrex, Kimax, etc.) for work involving non-ambient pressure or temperature work.
5. Use hand protection when picking up broken glass. (Use a brush to sweep small pieces into a dustpan.)
6. Seek instruction in the use of glass equipment designed for specialized tasks. (For example, separatory funnels containing volatile solvents can develop considerable pressure during use.)

**Fire Prevention in the Laboratory**

Observe the following rules when using flammable materials in laboratory operations:

1. NEVER use an open flame to heat a flammable liquid or for vacuum distillation.
2. Use an open flame only when necessary and extinguish it when it is no longer actually needed.
3. Do not light a flame unless all flammable substances are removed from the immediate area. Be sure that containers of flammable materials in the area are tightly closed.
4. Notify other occupants of the laboratory before lighting a flame.
5. Store flammable materials properly. Separate flammable chemicals from oxidizers.
6. Use only non-sparking electrical equipment when volatile flammable materials may be present.
7. Minimize quantities of flammable solvents in the lab. (See Table 2: *Recommended Maximum Quantities of Flammable Liquids in Research Laboratories*

**Vacuum Systems**

Glass vacuum systems pose severe implosion hazards. Follow these guidelines and requirements to system safety:

1. Ensure that pumps have belt guards in place during operation.
2. Ensure that service cords and switches are free from defects.
3. Always use a trap on vacuum lines to prevent vapors from being drawn into the vacuum pump, building vacuum line, or water drain.
4. Replace and properly dispose of vacuum pump oil that is contaminated with condensate. Used pump oil must be disposed as hazardous waste.
5. Place a pan under pumps to catch oil drips.
6. Do not operate pumps near containers of flammable chemicals.
7. Do not place pumps in an enclosed, unventilated cabinet.

**IMPORTANT:** All glass vacuum equipment is subject to possible implosion. Conduct all vacuum operations with a table shield or in a fume hood. Do not underestimate the pressure differential across the walls of glassware that can created by a water aspirator.

The glassware used with vacuum operations must meet the following requirements:

1. Only heavy-walled round-bottomed glassware should be used for vacuum operations. The only exception to this rule is specifically designed for vacuum operations, such as an Erlenmeyer filtration

flask.
2. Wrap exposed glass with tape to prevent flying glass if an implosion occurs.
3. Carefully inspect vacuum glassware before and after each use. Discard any glass that is chipped, scratched, broken, or stressed.

When possible, use molded plastic desiccators with high tensile strength or a perforated metal desiccator guard for glass desiccators.

**Cold Traps and Cryogenic Hazards**

A cold trap is a condensing device to prevent liquid contamination in a vacuum line. Guidelines for using a cold trap include:

1. Locate the cold trap between the system and vacuum pump.
2. Ensure that the cold trap is of sufficient size and cold enough to condense vapors present in the system.
3. Check frequently for blockages in the cold trap.
4. Use isopropanol/dry ice or ethanol/dry ice instead of acetone/dry ice to create a cold trap. Isopropanol and ethanol are less expensive, less toxic, and less prone to foam.
5. Do not use dry ice or liquefied gas refrigerant bath as a closed system. These can create dangerous uncontrolled high pressures.

Extreme cold is the primary hazard of cryogenic materials (e.g., liquid oxygen, liquid nitrogen, dry ice). Cryogens and the surfaces they cool can cause severe burns if allowed to contact the skin. Use gloves and a face shield if needed when preparing or using some cold baths.

1. Do not use cryogens to cool a flammable mixture in the presence of air. Oxygen (from the air) can condense on the surface of the container resulting in an explosion hazard.
2. Use appropriate dry gloves when handling dry ice.
3. Avoid excess frothing by adding dry ice slowly to the liquid portion of the cooling bath.
4. Do not breathe vapors or lower your head into a dry ice chest: carbon dioxide is heavier than air, and suffocation can result.

**Pressurized Systems**

Do not carry out a reaction in, or apply heat to, a closed system unless it is designed and tested to withstand pressure. Pressurized apparatus should have an appropriate relief device. Use an inert gas ebulator system to avoid bubbling or pressure buildup for reactions that cannot be opened directly to the air.

**Unattended Operations**

Avoid unattended operations. When it is necessary to carry out laboratory operations continuously or overnight, it is essential to plan for interruptions in utility services such as electricity, water, coolant, etc. These operations must be designed to be safe, and plans should be made to minimize hazards in case of failure. Wherever possible, arrange for routine inspection of the operation and, in all cases, leave the laboratory lights **ON** and place an appropriate sign on the door.

**Working Alone**

It is imprudent practice to work alone in a laboratory building. Arrangements should be made between individuals working in separate laboratories outside of working hours to cross check periodically. Do not undertake hazardous procedures, when alone in the laboratory.

Under unusual conditions, special rules may be necessary. The laboratory supervisor will determine whether the work requires special safety precautions such as having two persons in the same room during a particular operation.

**Prior Approval**

Prior to engaging in a laboratory task, employees must obtain prior approval to proceed from the supervisor or his or her designee whenever:

1. A new laboratory procedure or test is initiated.
2. It is likely that toxic concentrations could be reached or other hazardous situations could arise.
3. There is a change in a procedure or test, even if it is very similar to prior practices. Change in a procedure or test means:
    a. A 10% or greater increase or decrease in the amount of one or more hazardous chemicals (including catalysts) used.
    b. A substitution or deletion of any of the chemicals in a procedure.
    c. Any significant change in the system or in other conditions under which the procedure is to be conducted.
4. There is a failure of any of the equipment used in the process, especially of safeguards such as fume hoods or clamped apparatus.
5. There have been previous unexpected results or potential or near accidents
6. Members of the laboratory staff become ill, suspect that they or others have been exposed, or otherwise suspect a failure of any safeguards.

**Viligance**

Be alert to, and immediately report, any unsafe conditions or activities to your supervisor. Each laboratory worker should remember that injuries can and do occur outside the laboratory or other work area. It is important that safety be practiced in offices, stairways, corridors, and other places. Safety is largely a matter of common sense, but a constant safety awareness of everyday hazards is vital.

**Regulated or Restricted Access Areas or Procedures**

Access to the following Areas or Procedures are not permitted without supervisor approval:

_____
_____
_____
_____

**Reporting Accidents and Hazardous Conditions**

Emergency telephone numbers to be called in the event of fire, accident, water or gas leak, or hazardous chemical spill should be posted prominently in each laboratory. In addition, the numbers of the laboratory workers and their supervisors should be posted. Notify these persons immediately in the event of an accident or emergency.

ALL accidents, near accidents and hazardous conditions should be promptly reported to the laboratory supervisor. First Report of Injury Forms shall be completed and filed as required for all "Reportable Injuries." All other accidents or near accidents should be reported to the Safety Office or the Human Resources Department.

## References


Bretherick, L. *Handbook of Reactive Chemical Hazards,* 5th Ed., Butterworth-Heinemann, Oxford, England, 1995. (Evans Library: T55.3.H3 B73 1995)

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*Safe Storage of Laboratory Chemicals*, D. A. Pepitone, Ed., John Wiley & Sons, New York, 1984.

*Prudent Practices in the Laboratory, Handling and Disposal of Chemicals*, National Research Council, National Academy Press, Washington, D.C., 1995.

Steere, Norman V., *Handbook of Laboratory Safety*, Chemical Rubber Company, Cleveland, OH., 1970.

*Texas A&M University Safety Manual*, (http://ehsd-online.tamu.edu).

## Table 1
## Properties of Volatile Laboratory Chemicals

| Chemical | Flash Point [1] | Boiling Point [1] | Ignition Temp [1] | Flammable Limit (% by vol. in air) | | NFPA Fire Hazard Category[2] |
|---|---|---|---|---|---|---|
| | | | | Lower | Upper | |
| Acetaldehyde | -38 | 21.1 | 175 | 4.0 | 60 | 4 |
| Acetic acid (glacial) | 39 | 118 | 463 | 4.0 | 20 | 2 |
| Acetone | -17.8 | 56.7 | 465 | 2.6 | 12.8 | 3 |
| Acetonitrile | 6 | 83 | 524 | 3 | 16 | 3 |
| Benzene | -11.1 | 80 | 540 | 1.3 | 7.1 | 3 |
| Carbon disulfide | -30 | 46 | 80 | 1.3 | 50 | 3 |
| Cyclohexane | -20 | 82 | 245 | 1.3 | 8.0 | 3 |
| Diethylamine | -23 | 57 | 312 | 1.8 | 10 | 3 |
| Diethyl ether | -45 | 35 | 160 | 1.9 | 36 | 4 |
| Dimethyl sulfoxide | 95 | 189 | 215 | 2.6 | 42 | 1 |
| Ethyl alcohol | 13 | 78.3 | 365 | 3.3 | 19 | 3 |
| In water 95% | 17 | | | | | |
| 80% | 20 | | | | | |
| 60% | 22 | | | | | |
| 40% | 26 | | | | | |
| n-Heptane | - 3.9 | 98.3 | 215 | 1.1 | 6.7 | 3 |
| n-Hexane | -21.7 | 68.9 | 225 | 1.1 | 7.5 | 3 |
| Isopropyl Alcohol | 11.7 | 82.8 | 399 | 2.0 | 12 | 3 |
| Methyl alcohol | 11.1 | 64.9 | 385 | 6.7 | 36 | 3 |
| Methylethyl ketone | - 6.1 | 80.0 | 516 | 1.8 | 10 | 3 |
| Pentane | -40.0 | 36.1 | 260 | 1.5 | 7.8 | 4 |
| Styrene | 32.2 | 146 | 490 | 1.1 | 6.1 | 3 |
| Tetrahydrofuran | -14 | 66 | 321 | 2 | 12 | 3 |
| Toluene | 4.4 | 111 | 480 | 1.2 | 7.1 | 3 |
| p-Xylene | 27.2 | 138 | 530 | 1.1 | 7.0 | 3 |

[1]($^{O}$C)
[2]National Fire Protection Association (NFPA 704)

| [2]NFPA HAZARD CATEGORY | | | |
|---|---|---|---|
| | **Fire Hazard (Flash points)** | **Reactivity** | **Health Hazard (Acute)** |
| 4 | Extremely flammable(<23 C) | Unstable, may detonate | Extreme hazard |
| 3 | Highly flammable (23-39C) | May detonate if initiated | High hazard |
| 2 | Flammable (39-93C) | Violent chemical change at high T or P | Moderate hazard |
| 1 | Combustible (>93C) | Normally stable; May be unstable if heated | Low hazardous |
| 0 | Will not burn | Stable | Normal material |

## Table 2
## Recommended Maximum Quantity[1] of Flammable Liquids Within A Non-Sprinklered[2] Research Laboratory

| | FLAMMABLE LIQUID CATEGORY | | | | |
|---|---|---|---|---|---|
| **CONTAINER TYPE** | 4 | 3 | 2 | 1 | 0 |
| Glass | 1 L | 2 L | 4 L | 4 L | 20 L |
| Metal or Approved Plastic | 4 L | 4 L | 4 L | 4 L | 20 L |
| Safety Can | 8 L | 8 L | 8 L | 8 L | 20 L |
| Metal Drum | N/A[3] | N/A | N/A | N/A | 120 L |

[1]Quantities based upon proper storage within a Flammable Solvents Storage Cabinet
[2]Most TSU research laboratories are NOT sprinklered [3]N/A = Not allowed

**Limit the total combined volume of Class 4 + 3 flammable liquids within a laboratory to 10 L.**

## Table 3
## Peroxide-Forming Chemicals

a. Chemicals that form explosive levels of peroxides without concentration. Severe peroxide hazard after prolonged storage, especially after exposure to air. All have been responsible for fatalities. *Test for peroxide formation or* ***discard after 3 months.***

| | |
|---|---|
| (di)isopropyl ether | divinyl acetylene |
| potassium metal | potassium amide |
| sodium amide | vinylidene chloride |

b. Peroxide hazard on concentration. *Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.*

| | |
|---|---|
| Acetal | Furan |
| Acetaldehyde | 4-Heptanol |
| Benzyl alcohol | 2-Hexanol |
| Cumene (isopropylbenzene) | Methyl acetylene |
| Cyclohexanol | 3-Methyl-1-butanol |
| Cyclohexene | Methyl cyclopentane |
| Cyclopentene | Methyl-isobutyl ketone |
| Diacetylene (butadiene) | 4-Methyl-2-pentanol |
| Decahydronaphthalene (decalin) | 2-Pentanol |
| Dicyclopentadiene | 4-Penten-1-ol |
| Diethylene glycol dimethyl ether (diglyme) | 1-Phenylethanol |
| Diethyl ether | 2-Phenylethanol |
| Dioxanes | Tetrahydrofuran |
| Ethylene glycol ether acetates (cellosolves) | Tetrahydronaphthalene |
| Vinyl ethers | Other secondary alcohols |

c. Chemicals, which are a hazard due to, peroxide initiation of autopolymerization. The peroxide forming potential increases for liquids of this group, especially for butadiene, chloroprene and tetrafluoroethylene, such that these materials should be considered as a peroxide hazard. *Test for peroxide formation or discard after 1 year.*

| | |
|---|---|
| Acrylic acid | Styrene |
| Acrylonitrile | Tetrafluoroethylene |
| Butadiene | Vinyl acetate |
| Chlorobutadiene | Vinyl acetylene |
| Chlorotrifluoroethylene | Vinyl chloride |
| Methyl methacrylate | Vinyl pyridine |
| | Vinyldiene chloride |

## Table 4
## Health Hazard Rating: Acute Exposure

| Relative Hazard | Ingestion $LD_{50}$ mg/Kg | Inhalation $LC_{50}$ (ppm), 1 hr exposure | Eye Contact (Liquid) | Skin Penetration $LD_{50}$, ml/Kg | Skin Irritation |
|---|---|---|---|---|---|
| 4 | < 1 | < 20 | Extremely corrosive | < 0.02 | Necrosis – 10% soln. |
| 3 | > 1 - 50 | > 20 - 200 | Corrosive, Irreversible corneal opacity | > 0.02 – 0.2 | Necrosis - Undiluted |
| 2 | > 50 - .5K | >.2K– 2K | Irritating, reversible corneal opacity ≥ 7 days | > 0.2 – 2.0 | Erythema & Slight edema from undiluted |
| 1 | >.5K – 5K | > 2K – 10K | Slightly irritating | > 2.0 - 20 | Slight erythema - undiluted |
| 0 | > 5K | > 10K | Non-irritating | > 20 | Non-irritating |

**0 = relatively non-hazardous; 1=low hazard; 2=moderate hazard; 3=high hazard; 4=extreme hazard**

# Appendix A

### PRECURSOR CHEMICALS AND LABORATORY APPARATUS PREPAREDNESS PLAN

**Preparedness at Texas Southern University of the October 1995 Texas Higher Education Coordinating Board Memorandum of Understanding on Controlled Laboratory Apparatus and Chemicals**

The Texas Department of Public Safety (DPS) and the Texas Higher Education Coordinating Board (HECB) signed a Memorandum of Understanding (MOU) that establishes responsibilities on institutions of higher education for implementing and maintaining a program for reporting information concerning controlled substances, controlled substance analogues, chemical precursors, and chemical laboratory apparatus used in educational or research activities. This document defines the requirements and procedures necessary for compliance with the MOU by Texas Southern University. Full text of the MOU is available from the TSU Safety Department (741-4055).

The objective of this plan is to define institutional procedures for the use of controlled items (chemical precursors and certain laboratory equipment and glassware) in the facilities of Texas Southern University.

Please distribute the Preparedness Plan to all persons affected. Post "**IMPORTANT NOTICE**" (BELOW) in areas where controlled items are ordered, received, used or stored.

The following is a list of the controlled items including precursor chemicals, laboratory apparatus and glassware whose purchase, use, transfer and disposal must be monitored.

**Precursor Chemicals**

Methylamine
Ethylamine
D-Lysergic acid
Ergotamine tartrate
Diethyl malonate
Malonic acid
Ethyl malonate
Barbituric acid
Piperidine

**Laboratory Apparatus**

Condensers
Distilling apparatus
Vacuum dryers
Three-necked flasks
Distilling flasks
Tableting machines
Encapsulating machines
Filter funnels, Buchner funnels, and separatory funnels
Erlenmeyer flasks, two-necked flasks, single-necked

N-Acetyl anthranilic acid
Pyrrolidine
Phenylacetic acid
Anthranilic acid
Ephedrine
Pseudoephedrine
Norpseudoephedrine
Phenylpropanolamine

flasks, round-bottom flasks, thermometer flasks, and filtering flasks
Soxhlet extractors
Transformers
Flask heaters
Heating mantles
Adapter tubes

Controlled Substance Analogue

"*Controlled substance analogue*" is a substance that is substantially similar in chemical structure to that of a controlled substance or has central nervous system activity that is substantially similar to, or greater than that of a controlled substance.

**NOTE:** The MOU does not establish any de minimis quantities of precursor chemicals nor size of glassware or equipment.

**Prescription and non-prescription medicinal formulations are exempted.**

The following procedures and requirements are necessary for TSU to comply with the MOU.

1. **Responsible Party:** any person who uses or has access to, or control of the listed items, including investigators, laboratory personnel, instructors, laboratory storeroom personnel, purchasing agents and surplus property personnel.
2. **Maintain Purchase Order Records:** Purchase orders that include controlled items should be marked with an asterisk, highlight or some other similar manner readily distinguishable from all other items appearing on the purchase order. Purchase records are to be maintained according to State and Federal requirements, and are subject to DPS audit.
3. **Do Not Sell, Furnish or Transfer** any controlled items (including surplus property) to a person or entity not holding a DPS permit or waiver, unless the recipient is specifically exempted by law or rule. Every sale, furnishing or transferring of a controlled item leaving the immediate campus (where the specific controlled item is stored and inventoried) should be reported (by the 15th day of the next month) to the DPS on a Nar-22 Form. The Safety Officer will assist the TSU Surplus Property and Inventory Department in compliance with the MOU.
4. **Report to the Texas Southern University Police** promptly upon discovery of a readily unacceptable discrepancy, pilferage or theft of a controlled item. UPD is responsible for forwarding the report to DPS.
5. **Security**
    a. The Director of Security and University Police has primary responsibility for all matters associated with security and law enforcement on the TSU Campus.
    b. Maintain locked storage for controlled precursor chemicals and controlled substance analogues. Strictly limit access to these chemicals. Use records should be maintained.
    c. Limit access to storerooms containing listed items to authorized personnel. Lock storage areas when unattended.
    d. All doors and windows into any rooms in which controlled items are used or stored must be locked when authorized personnel are not present.
6. **Notification and Awareness**
    a. Departments and units affected by the MOU should post in prominent and strategic location(s), notices to inform personnel of the MOU and of the steps necessary for compliance. See "**IMPORTANT NOTICE** " in Appendix E.
    b. Encourage personnel to be alert and attentive to the disappearance of controlled items and to report such losses as appropriate.
7. **Assistance from the Texas Department of Public Safety**
    Upon request, the DPS will provide technical advice to the institution and will assist UPD in investigating losses, etc. covered by the MOU.

If there are any questions concerning these documents, please contact Alus Dove (713) 313-1098 or Fredrick Holts (713) 313-1921, Director of Safety, TSU Safety Department. Contact Chief Roger Byars, University Police (713) 313-1814 for assistance with security and police matters.

# Important Notice

**A Memorandum of Understanding between the Texas Department of Public Safety and the Texas Higher Education Coordinating Board places record-keeping and control responsibilities on institutions, including Texas Southern University. The MOU applies to the following chemicals, laboratory glassware, equipment and controlled substance analogues.**

| **Precursor Chemicals** | **Laboratory Apparatus** |
|---|---|
| Methylamine | Condensers |
| Ethylamine | Distilling apparatus |
| D-Lysergic acid | Vacuum dryers |
| Ergotamine tartrate | Three-necked flasks |
| Diethyl malonate | Distilling flasks |
| Malonic acid | Tableting machines |
| Ethyl malonate | Encapsulating machines |
| Barbituric acid | Filter funnels, Buchner funnels, and separatory funnels |
| Piperidine | Erlenmeyer flasks, two-necked flasks, single-necked |
| N-Acetyl anthranilic acid | flasks, round-bottom flasks, thermometer flasks, and |
| Pyrrolidine | filtering flasks |
| Phenylacetic acid | Soxhlet extractors |
| Anthranilic acid | Transformers |
| Ephedrine | Flask heaters |
| Pseudoephedrine | Heating mantles |
| Norpseudoephedrine | Adapter tubes |
| Phenylpropanolamine | |
| Controlled Substance Analogue | |

**"Controlled substance analogue"** is a substance that is substantially similar in chemical structure to that of a controlled substance or has central nervous system activity that is substantially similar to, or greater than that of a controlled substance.

**NOTE: The MOU does not establish any de minimis quantities of precursor chemicals nor size of glassware or equipment.**
**Prescription and non-prescription medicinal formulations are exempted.**

## PROCEDURES

The following procedures and requirements are necessary for TSU to comply with the MOU. They apply to all persons who use or have access to, or control, any of the listed items including investigators, laboratory personnel, instructors, laboratory storeroom personnel, purchasing agents and surplus property personnel.

1. **PURCHASE ORDER RECORDS:** Identify controlled items on purchase orders by marking with an asterisk, highlight or some other similar manner readily distinguishable from all other items appearing on the purchase order. Maintain purchase records according to State and Federal requirements. Records are subject to DPS audit.
2. **SALE, FURNISHING OR TRANSFER OF CONTROLLED ITEMS (INCLUDING SURPLUS PROPERTY)** to a person or entity not holding a DPS permit or waiver, unless the recipient is specifically exempted by law or rule is not permitted. Every sale, furnishing or transferring of a controlled item leaving the immediate campus (where the specific controlled item is stored and inventoried) should be reported (by the 15th day of the next month) to the DPS on a Nar-22 Form (Available from the Surplus Property Office).
3. **REPORT TO THE TEXAS SOUTHERN UNIVERSITY POLICE** promptly upon discovery of a readily unacceptable discrepancy, pilferage or theft of a controlled item. UPD is responsible for forwarding the report to DPS.
4. **SECURITY** The Director of Safety and University Police Department has primary responsibility for all matters associated with security and law enforcement on the TSU Campus.
   a. Controlled precursor chemicals and controlled substance analogues should be locked. Access to these chemicals should be strictly limited. Use records should be maintained.
   b. Restrict access to storerooms and other areas containing listed items to authorized personnel. Lock storerooms when unattended.
   c. Laboratory doors should be kept closed and should be locked when unoccupied and during non-use periods.

**5 NOTIFICATION AND AWARENESS**

   a. Departments and units affected by the MOU should post a copy of this notice in prominent and strategic location(s).
   b. Be alert and attentive to the disappearance of controlled items and report such losses to your supervisor.

# APPENDIX B

# TSU HAZARDOUS WASTE PROGRAM

# MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE

Generators are responsible for following the University disposal procedures, for assuring that their employees are trained in proper disposal procedures, and for properly identifying the hazardous chemical waste generated. The TAMUG Hazardous Waste Program is intended to assure compliance with applicable Federal and State regulations for the proper management of hazardous chemical waste and to reduce adverse effects to human health and the environment.

- A **material becomes "waste**" when the individual generator determines that it is no longer useful and should be discarded. If the material is to be discarded, the Director of Safety will determine whether the chemical waste is non-hazardous or hazardous. "Hazardous chemical waste" includes materials that are classified as "ignitable," "reactive," "corrosive," "toxic," "Universal Waste "and" Material is not excluded from regulations." Contact the Director of Safety for assistance in categorizing chemical waste.

- **Non-hazardous wa**ste may be disposed of using the sanitary sewer or regular trash. Additional information about non-hazardous waste disposal can be obtained from the Safety Officer.

- **Gas cylinders** should be returned to the manufacturer or distributor whenever possible. Non-returnable cylinders should be tagged as hazardous waste.

- **Photographic lab** waste containing **silver** must be disposed as hazardous chemical waste. However, some new developing equipment includes a filtration system that removes the **silver.** Photographic lab effluent that does not contain silver may be discarded through the sanitary sewer system. Please notify the Director of Safety if you have this type of equipment.

- **"Mixed Waste"** (includes both radioactive material and hazardous chemicals) should be initially routed through the Radiation Safety Officer.

- **"Unknown Waste"** is chemical waste that can't be identified by the generator. Such material should be should be identified as "Unknown" on the Waste Disposal Tag. Unknowns will be picked up by the Safety Office. Generators will be charged for the cost of analysis necessary to determine the chemical identity for proper disposal.

## Separation and Segregation of Hazardous Waste

Hazardous chemical waste is categorized into the following hazard classes..

Halogenated solvents
Non-halogenated solvents
Acids (inorganic or organic)
Bases (inorganic or organic)
Heavy metals (silver, cadmium, lead, mercury, etc.)
Poisons (inorganic or organic)
Reactives (cyanides, sulfides, water reactive chemicals, peroxides, etc.)

- Do not commingle these classes in the same waste container.
- Do not combine inorganic heavy metal compounds and organic waste solvents.
- Do not combine non-hazardous waste (e.g., mixture of water, dilute acetic acid, and sodium bicarbonate) with hazardous chemical waste.
- Dry materials (paper, rags, towels, gloves, or Kim Wipes, etc.) contaminated with flammable or extremely toxic chemicals must be double-bagged in heavy-duty plastic bags and must be treated as hazardous chemical waste. **Do not use biohazard bags**.
- Sharps (needles, razor blades, etc.) are classified as biohazardous waste even if they are not contaminated. Sharps must be encapsulated (Place the sharps in a "puncture resistant" container or plastic/metal container and then fill it with paraffin or plaster of Paris.). Discard the containers of sharps as biohazardous waste. *Contact the Safety Office for additional information.*

## Hazardous Waste Containers

- Waste generators are required to provide their own waste containers that are compatible with the chemical contents (e.g., do not use metal containers for corrosive waste or plastic containers for organic solvent).
- Containers must be in good condition and not leak. All containers must have suitable screw caps or other means of secure closure. When large waste containers (>10 gallons, total volume) are required, contact the Safety Office for assistance on selection and placement of appropriate container type and size.
- Never overfill hazardous waste containers. Expansion and excess weight can lead to spills, explosions, and extensive environmental exposure.
- Containers of solids must not be filled beyond their weight and volume capacity.
- Jugs and bottles should not be filled above the shoulder of the container.
- Closed head cans) should have at least two inches (5 gallons or less) or four inches (larger than 5 gallons) of headspace between the liquid level and the head of the container.
- Containers must be closed or sealed to prevent leakage. ***All waste collection containers must be kept closed except when adding or removing material.***

## Containment and Storage of Hazardous Chemical Waste

- Waste generators must maintain custody and control of the storage areas and ensure the waste is accessible to Safety Office personnel.
- Individual waste generators shall assure that their hazardous chemical wastes are accumulated in safe, transportable containers, properly labeled, and stored to prevent human exposure to or environmental release of the waste materials.
- "Satellite Accumulation Areas" are locations designated by the Safety Office for storage of hazardous waste awaiting pickup and disposal. Consult with your supervisor or EHSD to determine the location of hazardous waste for your workplace.

## Labels and Labeling

- The original chemical label on containers used for waste accumulation must be destroyed or defaced.
- EPA regulations require that waste containers be labeled with the chemical contents and the words "Hazardous Waste" **when the chemical waste is first added**.
- **DO NOT DATE THE CONTAINER UNTIL READY FOR PICKUP AND DISPOSAL**
- Containers at TSU can be labeled in one of two methods:
- Using string, attach a completed **Hazardous Waste Disposal Tag except for the accumulation start date** (available from the Safety Office) to each new waste container when the chemical is first added.
- **Print the information on the tag legibly**.
- For containers larger than 5-gallons, a **Hazardous Waste Label** (available from the Safety Office) can be used. These labels have an adhesive back and are placed on the container when the chemical is first added.

## Disposal of Hazardous Chemical Waste

Waste containers that are full and/or ready for disposal are:

1. Tagged with a Hazardous Waste Disposal Tag. (See below) Fill in the accumulation start date on the disposal tag, and complete the on-line request for pickup located on the Safety Department Home Page

- *The Safety Office will not pickup containers* with improper caps, leaks, outside contamination, or improper labeling.
- It is violation of federal and state law to dispose of hazardous chemicals in any of the following ways:
- Disposal through the sanitary drain (sewer).
- Intentional disposal by evaporation in a fume hood. (This does not refer to normal fume hood use).
- Disposal in the regular trash.

**Disposal of Empty Chemical Containers**

Empty containers should be placed in a dumpster for disposal with other non-hazardous trash when the following requirements are satisfied.

- not contain free liquid or solid residue,
- be triple rinsed,
- have the label removed or defaced,
- have the lid or cap removed, and
- have a hole punched in the bottom (metal or plastic containers).

*It is not necessary to break empty glass containers when placed in a dumpster. Empty chemical containers not handled in this manner must be treated as hazardous chemical waste (very expensive).*

**HAZARDOUS CHEMICAL WASTE**

**Accumulation Start Date:** **(***Date waste first added)*
**Contents:** *(Chemical(s) identity and percentage)*

**HANDLE WITH CARE**
**Contains Hazardous or Toxic Waste**

**Follow the example below to properly complete your hazardous waste disposal tag:**

Attach An Individual Hazardous Waste Disposal Tag To **Each** Waste Container

Both upper and lower sections of the tag must be filled out completely and legibly **except for the accumulation date** when chemical is first added to a waste container. (This information is essential for record keeping).

* Fill in the **Accumulation Start Date** when the waste container is full and/or ready for pickup.

Secure the top part of the tag with a string that encircles the top of the container - **rubber bands, tape, and wire are not acceptable**.

** The "REQUESTOR" is the Principal Investigator or person in charge of the lab that generated the waste.

*** Chemical name/Common name. **Chemical formulas or abbreviations are not acceptable**.

*** List all chemical components in a waste container (including water). Lists may be continued on the back of the tag.

***Tags for containers of potentially explosive materials such as picric acid, silanes, nitro compounds, and ethers must indicate the percent concentration of these chemicals.

c. Place any additional Hazard Information about container contents in **REMARKS**.

(ATTACH TAG TO CONTAINER WITH STRING)

## HAZARDOUS WASTE DISPOSAL TAG

**REQUESTOR:** ** John Doe
**DEPT/PART:** Chemistry .
**PHONE**: 5-3140
**CHEMICAL(S)**: *** Methylene Chloride, Toluene

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## HAZARDOUS WASTE DISPOSAL TAG

**ACCUMULATION START DATE**: * 5/22/96
**REQUESTOR**: ** John Doe
**DEPT/PART**: Chemistry
**BLDG.NAME & NO**: Chemistry - 376
**ROOM NO**. 2002 **PHONE**: 5-3140
**CHEMICAL(S)**: *** Methylene Chloride, Toluene .

**PHYSICAL PROPERTY**: ☐ Liquid ☐ Solid ☐ Gas
☐ Other _____
**QUANTITY**: ☐ Pint ☐ Quart ☐ Gallon ☐ 5-Gallon
☐ Other 4 liter .
**CONTAINER TYPE**: ☐ Glass ☐ Metal
☐ Other _____
**REACTS WITH**: ☐ None ☐ Air ☐ Water
☐ Other _____
**HAZARDS:** ☐ Flammable ☐ Explosive ☐ Carcinogen
☐ Toxic ☐ Corrosive ☐ Other_____

**REMARKS :**

**Mail lower portion of tag to Environmental Health & Safety Department when container is ready for pickup.(713) 313-1048**

EHSD Form 15-13

# ATTACHMENT I

# Workplace Hazard Communication Preparedness Plan

**Workplace Preparedness Plan** Each *workplace* must have a written plan that describes how the TSU Hazard Communication Program is implemented in that workplace. Attachment I is to be completed by the designated department official, not by each Principle Investigator or Supervisor. This form, when completed and attached to a copy of the Texas Southern University Hazard Communication Program will meet this requirement. Employees should have ready access to the TSU HazCom Program and the Workplace Preparedness Plan.

# TSU HAZARD COMMUNICATION PROGRAM

## WORK PLACE PREPAREDNESS PLAN

1. **Name of Unit:**

2. **Person(s) or position(s) responsible for assuring compliance with training requirements:**

3. **Location of Employee Training Records:**

4. **Location of Safety Data Sheets:**

5. **Location(s) where the "NOTICE TO EMPLOYEES" is permanently posted:**

6. **Person(s) or position(s) responsible for compiling the annual Workplace Chemical Inventory:**

7. **Location where the Workplace Chemical Inventory Records are filed:**

# ATTACHMENT II

# EMPLOYEE TRAINING RECORDS

# Hazard Communication Training Record

I hereby acknowledge receipt of the Texas Southern University (TSU) Hazard Communication Program Training, which includes:

## GENERAL AND CHEMICAL SAFETY TRAINING

1._____information on interpreting SDSs and labels, and the relationship between the two methods of hazard communication;
2._____general methods of obtaining SDSs at TSU;
3._____generic information on hazardous chemicals;
a) hazards associated with chemical hazard groups (e.g., flammables, corrosives, toxics, and reactives) including acute and chronic effects;
b) methods for identifying specific chemicals within each chemical hazard group (e.g., DOT labels, NFPA 704 System, chemical container labels);
c) safe handling procedures, including proper storage and separation of incompatibles;
4._____proper use of appropriate protective equipment to minimize exposure to hazardous chemicals and first aid treatment to be used with respect to the hazardous chemicals;
5._____general instructions on spill cleanup procedures and proper disposal of hazardous chemicals.

_____ _____
Instructor Name(s)(Print) Date

## WORK AREA SPECIFIC TRAINING

6._____information on hazardous chemicals known to be present in the employees work area and to which the employees may be exposed, including:
a) location within the work area,
b) specific hazards, including acute and chronic effects,
c) safe handling procedures;
7._____work area location of SDSs, or procedures for obtaining SDSs;
8._____how to obtain and use appropriate personal protective equipment and first aid treatment to be used with respect to the hazardous chemicals;
9._____instructions on spill cleanup procedures, and proper disposal of hazardous chemical specific to that work area.

_____ _____
Instructor Name(s)(Print) Date

_____ _____
Employee Name(Print) Employee Department

_____ _____
*Employee Signature Date

***The employee is responsible for ensuring that this completed form is given to the person within their department/unit who is responsible for maintaining personnel records or is responsible for sending the form to the centralized personnel files.**

# Attachment III

## Work Area Diagram

**(Diagram of work area showing location of emergency equipment & supplies, personal protective equipment, designated areas, etc. Optional, but recommended)**