CHEMICAL HYGIENE PLAN

TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER™

Texas Tech University Health Sciences Center is committed to providing a safe and healthful work environment for faculty, staff, students, and visitors. In pursuit of this endeavor, the following Chemical Hygiene Plan (CHP) is provided to eliminate or minimize occupational exposure to hazardous chemicals in accordance with OSHA standard 29 CFR 1910.1450, "Occupational Exposures to Hazardous Chemicals in Laboratories".

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TTUHSC Chemical Hygiene Plan

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TTUHSC Chemical Hygiene Plan

I. Foreword

The use of hazardous chemicals is necessary to the research and academic operations at Texas Tech University Health Sciences Center. TTUHSC is committed to assure the safe and proper acquisition, use, and disposal of hazardous chemicals. Therefore, TTUHSC complies with the mandates of the Occupational Safety and Health Administration (OSHA) promulgated as 29 CFR 1910.1450, under the title, "Occupational Exposures to Hazardous Chemicals in Laboratories".

This regulation requires the development and implementation of a written Chemical Hygiene Plan that is, "capable of protecting employees from health hazards associated with hazardous chemicals used in the laboratory." The Chemical Hygiene Plan (CHP) included below was developed and implemented to meet this requirement. It sets forth procedures, and work practices needed for the protection of TTUHSC employees, students, visitors, and volunteers from health hazards associated with potential exposures to hazardous chemicals used in TTUHSC laboratories.

II. Training

All laboratory personnel are required to successfully complete the online course, "Laboratory Safety Essentials", which covers basic safety principles. This requirement applies to all laboratory workers. This includes but is not limited to employees, students, and volunteers who work in a laboratory or participate in laboratory activities.

Site specific, job-specific training is the responsibility of each employee's supervisor, Principal Investigator (PI), or faculty advisor and should cover specific hazards and work practices as follows.

A. Supervisors shall provide information about the specific hazards inherent in the work materials and/or procedures conducted in the lab;
B. Safety considerations shall be included in project and experiment planning;
C. Supervisors shall disallow untrained or unaware individuals to use laboratory materials or equipment.

In addition, each worker must take personal responsibility for their own safety. Laboratory workers should ask for job specific training from their supervisor. It should not be assumed that if no training is given there are no hazards. Workers shall also read chemical labels and Safety Data Sheets (SDSs), and ask questions when information is not clear. If the laboratory supervisor or PI cannot resolve a question, the worker should consult others, including their faculty advisors, department chair, or Safety Services.

III. Chemical Inventory

A current chemical inventory for each lab will be maintained through cooperative efforts between the laboratory staff and Safety Services.

When a new lab is set up, a chemical inventory will be provided by the new faculty member. Alternatively, Safety Services will assist the lab to perform an initial inventory. This will be determined on a case-by-case basis.

When new chemicals are ordered through the Tech Buy system, Safety Services will add those chemicals to the researcher's inventory.

When chemical containers are empty, the laboratory staff shall dispose of them into specially marked collection containers. These containers will be for deposition of empty containers only. If there is any chemical remaining, then it is considered chemical waste and shall be disposed of according to chemical waste procedures (refer to section VII.F). Safety Services will pick up empty containers and remove those items from the researcher's inventory in order to maintain an accurate chemical inventory.

IV. Approvals

Certain chemicals require registration with the Institutional Biosafety Committee (IBC) prior to initiation of work. Chemicals that meet any of the following criteria must be registered:

A. A GHS classification rating of 1 or 2 Oral, 1 Dermal, or 1 Inhalation;
B. A HMIS rating of 4;
C. An animal, oral LD_{50} of 50 mg/kg or less.

For proprietary compounds and chemicals of unknown toxicity, a judgment will be made on a case by case basis. Please contact Safety Services for assistance as soon as possible.

Forms may be found on the Research Integrity Website:
http://www.ttuhsc.edu/sponsoredprograms/ibc/

V. Safety Data Sheets

The Safety Data Sheet, or SDS, (formerly known as MSDS) is a summary of safety information for a chemical or solution. The SDS typically includes information about a chemical's physical properties, hazards, permissible exposure limits (PELs), as well as storage, spill, and handling precautions.

OSHA requires *manufacturers* and importers of chemicals to develop a SDS for these materials.

OSHA requires *users* of chemicals to maintain any SDSs received from vendors, and make them readily accessible to employees in their work areas.

At TTUHSC, SDSs can be accessed via our contract with ChemTel Expert Assistance Hotline / MSDS Fax Access by dialing 1-800-255-3924 (reference our Contract number: MIS0006468).

SDSs may also be found through the chemical vendor.

It is recommended that each work location keep a hard copy of SDSs for hazardous chemicals commonly used in that area.

VI. General Principles of Chemical Safety

A. Minimize all chemical exposures:

   i. Implement Administrative Controls such as written SOPs, posted warning signs, careful planning of experiments, etc..;

   ii. Utilize Engineering Controls such as chemical fume hoods or shielded chemical scales when needed;

   iii. Don appropriate Personal Protective Equipment (PPE) as a final measure of protection. Choose quality PPE appropriate for the materials in use and the work procedures performed. Use proper donning and doffing procedures to reduce the risk of exposure. Request assistance and/or training from your supervisor or Safety Services if needed;

   iv. Make use of Good Laboratory Practices. Develop safe habits for good chemical hygiene and general lab safety. Periodically evaluate plans and procedures and modify as needed.

B. Avoid underestimation of risk:

   i. For substances of no known significant hazard, exposure should be minimized;

   ii. For work with substances that present special hazards, special precautions should be taken;

   iii. Assume that any mixture will be more toxic than its most toxic component and that all substances of unknown toxicity are toxic.

C. Become familiar with emergency equipment such as eye washes, safety showers, and fire extinguishers. Know the location of these items and how to use them;

D. Avoid working alone in a building; do not work alone in a laboratory if the procedures being conducted are hazardous.

VII. Rules and Procedures for Working with Chemicals

The following should be used for essentially all laboratory work with chemicals:

A. **Planning**

   i. Prior to receipt of a substance, information on proper handling, storage, and disposal should be known to those who will be involved.

   ii. Plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation;

iii. Substitute less hazardous chemicals in laboratory procedures whenever possible;

iv. Consult a qualified physician to determine on an individual basis whether a regular schedule of medical surveillance is needed when working with toxicologically significant quantities of chemicals.

B. **Procurement**

i. All chemical purchases shall be ordered according to TTUHSC Purchasing policies;

ii. Chemicals should not be purchased in bulk or excessive amounts;

iii. Do not accept chemical containers without a proper label. Upon receipt of a package containing hazardous substances, don the appropriate PPE, and inspect the package carefully for any signs of breakage or leakage of material. If there are any signs of leakage, place the package in a chemical fume hood, protect from exposure, and call Safety Services for assistance.

C. **Distribution**

i. When chemicals are hand-carried through the building or from one building to another, the primary container should be placed in an outer secondary container such as a plastic tote, or rubber bottle carrier capable of containing the contents of the original container in the event of a spill;

ii. Use a cart to minimize risk;

iii. When transporting highly hazardous chemicals, use the freight-only elevators;

iv. Transport from the institution ("Shipping") must be in accordance with Department of Transportation (DOT) and International Air Transport Association (IATA) regulations. Consult the chemical SDS to find out if the chemical is regulated by DOT or IATA. **Shippers must be trained and certified before they may ship.** Contact Safety Services for information on training materials and classes. See TTUHSC OP 75.13 "Shipment of Hazardous and Infectious Materials" for more information. If the shipment is leaving the country then also refer to TTUHSC OP 73.16 "Export Controls" for export license information.

D. **Avoidance of Routine Exposure / Good Laboratory Practices**

Good Laboratory Practices are necessary to provide valid and reproducible scientific results, prevent contamination, and improve overall laboratory safety and security.
Develop and encourage safe habits; and avoid unnecessary exposure to chemicals by observing the following Good Laboratory Practices:

i. Ensure that all chemical containers are properly labeled;
    1. Do not remove or deface manufacturer labels;
    2. When using secondary containers, label the container with the name of the chemical, and at least general information regarding the hazards of the chemical(s).

ii. Do not smell or taste chemicals;

iii. Vent apparatus which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices;

iv. Inspect gloves before use to make sure they are not torn or damaged;

v. Workers who are allergic to latex should inform their supervisor as soon as possible so an alternative can be found;

vi. Choose gloves that are compatible with the chemicals you are working with;

vii. Glove compatibility charts may be found online. The following is one example: http://ansellpro.com/specware/index.asp ;

viii. Do not allow release of volatile substances in cold rooms, warm rooms, or biological safety cabinets since these have contained re-circulated atmospheres, which might allow vapors to build to dangerous levels;

ix. Do not use mouth suction for pipetting or starting a siphon;

x. Avoid practical jokes or other behavior that might confuse, startle or distract another worker;

xi. Eating, drinking, smoking, or application of cosmetics in any laboratory at TTUHSC is prohibited;

xii. Although hand lotion is considered a cosmetic and not recommended to be in the laboratory, it is acceptable if located at a desk or computer station;

xiii. Storage of food, beverages, or eating utensils in laboratory refrigerators, freezers, cold rooms, or storage areas is prohibited;

xiv. Wash hands before leaving the laboratory, and at the conclusion of each experiment or procedure;

xv. Unattended operations (laboratory procedures occurring unsupervised / unobserved) are strongly discouraged. However, if absolutely necessary, leave lights on, place an appropriate sign on the door, and provide for containment of harmful substances in the event of failure of a utility service (such as cooling water) to an unattended operation;

xvi. **Never** leave an open flame unattended;

xvii. Handle and store laboratory glassware with care to avoid damage; inspect glassware for damage before use, and do not use damaged glassware;

xviii. Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments should implosion occur.

E. **Housekeeping**

i. Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored;

ii. Replace or reinforce container labels that are faded, blurred, or otherwise difficult to read;

iii. Clean up the work area upon completion of an operation and at the end of each work shift;

iv. Do not block access to exits, fire extinguishers, safety showers, eye washes, electrical panels, or other emergency equipment;

v. Dispose of old or unused chemicals, mixtures, and solutions routinely (e.g., after each semester). Dispose of chemicals that have passed the expiration date printed on the manufacturer's label;

vi. Ensure trash, broken glass, sharps, recyclables, and chemical wastes are properly disposed;

vii. Ensure that all spills are cleaned up promptly and safely.

F. **Waste Disposal**

i. All chemical wastes generated in the lab will be disposed of through Safety Services in accordance with the TTUHSC Regulated Waste Disposal Manual, located on the Safety Services website;

ii. Safety Services will pick up chemical waste from the labs upon request in writing via the online form: http://www.ttuhsc.edu/admin/safety/forms/dispose_chemicals.aspx

iii. Waste should not be allowed to accumulate in the labs. Research personnel shall request pick up of waste on a regular basis;

iv. Before a worker's employment in the laboratory ends, chemicals for which that person was responsible should be discarded or assigned to another worker;

v. Indiscriminate disposal by pouring waste chemicals down the drain or adding them to mixed refuse for landfill burial is prohibited;

vi. Fume hoods shall not be used as a means of disposal for volatile chemicals.

G. **General Chemical Storage**

i. Amounts kept on hand should be as small as practical;

ii. Chemical inventories should be reviewed and evaluated at least annually, with any unneeded items being discarded or transferred to another laboratory;

iii. Chemicals should be stored based on compatibility;

iv. Chemicals within a compatible group may be stored alphabetically;

v. Incompatible chemicals must be physically separated during storage. If alternate cabinets are not available, items can be separated using physical containment barriers (ex: plastic tubs) inside a single cabinet;

1. Corrosives, flammable liquids, oxidizers, and highly reactive chemicals must be separated and stored properly to avoid an unwanted chemical reaction. In addition:
    a. Segregate acids from bases.
    b. Separate oxidizing acids (e.g., Hydrogen chloride) from organic acids (e.g., Acetic acid, formic acid).
    c. Segregate nitric acid from other acids.
2. See Table 1 below for more information on segregation.

vi. Hazardous chemicals should not be stored:
1. under sinks;
2. in fume hoods or biosafety cabinets;
3. on bench tops;
4. in hallways or stairwells (see OP 75.06);

vii. Large volume containers of hazardous chemicals should be stored on low shelving, preferably in trays to contain any spills or leaks;

viii. Avoid exposure to heat or direct sunlight;

ix. Examine chemical containers periodically (at least annually) for expiration date, deterioration, and container integrity.

H. **Flammable Liquid Storage**

i. Keep storage of flammable liquids in the laboratory at a minimum; Do not stock pile supplies of flammable chemicals;

ii. Flammables shall not be stored under fume hoods unless the cabinet under the fume hood was designed as a flammable storage cabinet;

iii. Storage of flammable liquids (including waste) outside approved flammable storage cabinets and safety cans must not exceed 10 gallons per 100 square feet of laboratory space;

iv. Storage inside flammable storage cabinets and approved safety cans must not exceed 20 gallons per 100 square feet of laboratory space;

v. Flammable storage cabinets should not be located near exits, electrical panels, or sources of heat or ignition;

vi. When cabinets are used for flammable liquid storage, they must be labeled as a flammable storage location;

vii. Corrosive materials should not be stored in flammable storage cabinets due to possible corrosion of the cabinet and incompatibility with organic solvents;

I. **Compressed Gas Storage**

i. Compressed gas cylinders must be stored in a secured upright position. The restraint must be appropriate and of adequate strength to prevent the cylinder from falling;

ii. Protective caps must be in place to cover the valve while cylinders are not in use;

iii. Always use a dolly when moving a tank;

iv. Always treat a cylinder or tank as if it were full;

v. Cylinders shall be labeled with the name of the contents;

J. **Controlled Substances**

i. The U.S. Drug Enforcement Administration (DEA) requires that personnel working with controlled substances must have a DEA license. Special inventory, security, record keeping requirements may apply. Please visit the U.S. DEA website at http://www.usdoj.gov/dea/ for more information.

Table 1. Chemical Storage Guidelines

CHEMICAL CLASS	RECOMMENDED STORAGE METHOD	EXAMPLES	INCOMPATIBLES SEE SDS IN ALL CASES
Corrosives –Acids INORGANIC	Store in a separate, lined/protected acid storage cabinet, or in deep corrosion-resistant spill trays. DO NOT store acids directly on metal shelves	Inorganic (Mineral) acids – Hydrochloric acid, Hydrofluoric acid, Phosphoric acid, Sulfuric acid, Chromic acid, Nitric acid	Flammable liquids, flammable solids, bases, and oxidizers, **organic acids**
Corrosives – Acids ORGANIC	Store in a separate, lined/protected acid storage cabinet, or in deep corrosion-resistant spill trays. DO NOT store acids directly on metal shelves.	Organic acids –Acetic acid, Formic acid, Trichloroacetic acid, Lactic acid	Flammable liquids, flammable solids, bases, and oxidizers, **inorganic acids**
Corrosives – Bases	Store in a separate storage cabinet or segregate with deep, corrosion-resistant spill tray.	Ammonium hydroxide, Potassium hydroxide, Sodium hydroxide	Flammable liquids, oxidizers, poisons, and acids
Explosives	Store in a secure location away from all other chemicals. Do not store in an area where they can fall.	Ammonium nitrate, Nitro urea, Sodium amide, Trinitroaniline, Trinitrophenol / Picric acid, Trinitrotoluene (TNT)	All other chemicals. *Keep away from sources of ignition*
Flammable Liquids	Store in a flammable storage cabinet. *Peroxide forming chemicals must be dated upon opening; e.g. Ether, Tetrahydrofuran, Dioxane*	Acetone, Benzene, Diethyl ether, Methanol, Ethanol, Hexanes, Toluene	Acids, bases, oxidizers, and poisons. *Keep away from sources of ignition*
Flammable Solids	Store in a separate dry cool area away from oxidizers, corrosives	Phosphorus, Carbon, Charcoal	Acids, bases, oxidizers, and poisons. *Keep away from sources of ignition*
Water Reactive	Store in a dry, cool location. Protect from water and the fire sprinkler system if applicable. Label location "Water Reactive Chemicals"	Sodium metal, Potassium metal, lithium metal, lithium aluminum hydride, sodium hydride	Separate from all aqueous solutions and oxidizers.
Oxidizers	Store in a deep spill containment tray inside a non-combustible cabinet, separate from flammable or combustible materials and reducing agents.	Sodium hypochlorite, Benzoyl peroxide, Potassium permanganate, Potassium chlorate, Potassium dichromate. The following are generally considered oxidizing substances: Peroxides, Perchlorates, Chlorates, Nitrates, Bromates, Superoxides	Separate from reducing agents, flammables, and combustibles and organic materials.
Poisons / Toxic	Store separately in a vented, cool, dry, area in chemically resistant secondary containers.	Cyanides, heavy metal compounds, i.e. Cadmium, Mercury, Osmium	Flammables liquids, acids, bases, and oxidizers.
General Chemicals – Non-Reactive	Store on general laboratory benches or shelving.	Agar, Sodium chloride, Sodium bicarbonate, and most non-reactive salts	See SDS

VIII. Particularly Hazardous Substances

Some substances are considered particularly hazardous because they carry a higher level of risk. When working with a substance that is particularly hazardous, it is important to increase the safety and containment measures accordingly in order to maintain a safe work environment. Use and store these substances only in areas of restricted access with special warning signs. The below recommendations are in addition to the general chemical safety guidelines outlined above.

A. Highly Reactive Chemicals

i. These are inherently unstable and can react in an uncontrolled manner to liberate heat, toxic gases, or explode. These include shock sensitive chemicals, high-energy oxidizers and peroxide formers;

ii. Before working with these materials, employees shall review relevant safety information to evaluate proper storage and handling procedures;

iii. Use a chemical fume hood with the sash as low as possible for all reactions;

iv. Secure reaction equipment properly;

v. Use impact protection (e.g. shields / guards) in addition to chemical splash protection (e.g., goggles, face shields, gloves, lab coats);

vi. Handle shock sensitive chemicals gently to avoid friction, grinding, and impact;

vii. Reagents with suspect purity and/or age should be disposed through Safety Services.

B. Peroxidizable compounds

These have caused many laboratory accidents, including unexpected explosions of residues remaining after solvent distillation. Peroxides form by the reaction of the chemical with oxygen allowed in the headspace of chemical containers after the container is opened for the first time.
Most organic peroxides are sensitive to varying degrees to shock, heat, or friction. The rate of peroxide formation will depend upon the compound. Some peroxides quickly build up to an explosive level and some are only explosive on concentration, such as when a solvent is distilled.

i. Date all incoming containers of peroxide formers when received and again when opened. If there is an expiration date on the container, be sure to use or dispose of the chemical by that date;

ii. Purchase the smallest possible quantity for your needs;

iii. Store peroxide formers in sealed, air tight containers such as dark amber glass with a tight-fitting cap. Iron inhibits the formation of peroxides in some materials, which is why diethyl ether and some other materials are sold in metal cans;

iv. Containers of peroxide formers should be stored away from heat and light and protected from physical damage and ignition sources;

v. Peroxide forming compounds should not be stored at or lower than the temperature at which the peroxide freezes or precipitates, as this will make these compounds extremely sensitive to shock. NOTE: Refrigeration does not prevent (nor inhibit) peroxide formation;

vi. Inspect containers of peroxide forming compounds frequently, looking for signs of precipitation, stratification of liquid, crystal formation or other irregularities;

1. The presence of any of these signs indicates the potential for a shock sensitive container. **Do not move the container and contact Safety Services as soon as possible. Do not attempt to open a container of peroxide forming liquid if there are crystals around the cap and / or in the bottle. The vibration / friction of screwing the cap could detonate the bottle.**
2. Diethyl ether or other compounds commonly sold in metal cans cannot be visually inspected. Therefore, metal containers of peroxide forming materials whose age and use history are unknown should be assumed to contain dangerous levels of peroxides and should be disposed by contacting Safety Services.

vii. Avoid the distillation of peroxide formers without first testing for the existence of peroxides. Most explosions occur when a material is distilled to dryness;

viii. Test strips for the detection of peroxides may be purchased from various safety supply vendors. Establish a laboratory routine to test all peroxide-forming chemicals on a regular basis (no less than every three months).

C. **Chemicals of Highly Acute and Chronic Toxicity**

i. These chemicals are hazardous at very low concentrations. Substances of high *acute* toxicity cause immediate health effects at very low concentrations. Substances that have high *chronic* toxicity cause damage after repeated exposure over a period of time;

ii. Some common examples of chemicals with high acute toxicity are sodium cyanide, sodium fluoride, and sodium azide;

iii. When working with chemicals of high acute or chronic toxicity, the following practices must be observed:
    1. The SDS must be read, and all recommended precautions be taken.
    2. Notify all employees of the particular hazards associated with this work.
    3. Minimize contact with these chemicals by any route of exposure (e.g., inhalation, skin contact, mucous membrane contact, or injection).
    4. Develop and implement an emergency plan for each operation.
    5. Decontaminate work surfaces after completing procedures.
    6. Remove potentially contaminated PPE before leaving the area and decontaminate it or properly dispose.

D. **Reproductive Toxins**

i. This includes embryotoxins, mutagens, teratogens, and abortogens (e.g. organomercurials, lead, formamide);

ii. Women of child-bearing potential shall handle such substances in a hood, using protective apparel including gloves and a lab coat;

iii. Review continued use annually, and consult a physician when appropriate.

IX. Personal Protective Equipment (PPE)

A. Personal protective equipment is extremely important for protection from workplace hazards. It is the last line of defense after engineering controls (e.g. fume hood) and administrative controls (e.g. SOPs). Laboratory workers must use careful consideration when selecting the proper PPE to use for any given task. The specific hazards associated with the work being done must be carefully considered when selecting PPE. In addition, PPE must be carefully maintained, and users must know how to properly use and care for the PPE. Most importantly, they must know the limitations of their PPE and not use PPE that is inappropriate for the job or is damaged or compromised.

B. Responsibilities

i. It is the responsibility of the PI to make all necessary PPE available to laboratory employees;

ii. It is the responsibility of the laboratory personnel to conduct hazard assessments of the specific conditions occurring in the laboratory in order to determine what PPE is necessary to safely carry out the operation;

iii. PPE shall be inspected before each use for signs of damage, wear, or contamination, and replaced as needed;

iv. Safety Services staff are available to assist with hazard assessments, PPE selection, and training on the proper use and maintenance and limitations of PPE.

C. Basic PPE requirements:

i. Always wear protective apparel compatible with the required degree of protection for substances being handled;

ii. Do not wear personal clothing that leaves large areas of skin exposed (ex: shorts and tank tops);

iii. Wear closed toe shoes at all times in the laboratory; Do not wear sandals or perforated shoes;

iv. Confine long hair and loose clothing;

v. Wear a lab coat when working with hazardous materials, or when hazardous materials are being used in the same work area;

vi. Wear appropriate eye protection where chemicals are stored or handled;

vii. Wear appropriate gloves when the potential for contact with hazardous materials exists. Some chemicals can quickly "break though" the glove material. For glove selection for a particular hazard, refer to the specific glove manufacturer's selection chart. Additionally, the following are a few examples of the many helpful resources that can easily be found with a quick internet search:

1. http://www.showabestglove.com/site/default.aspx
2. http://www.microflex.com/Products/~/media/Files/Literature/Domestic%20Reference%20Materials/DOM_Reference_Chemical%20Resistance.ashx
3. https://www.uic.edu/depts/envh/HSS/Documents/Resistance%20Guide%20for%20Microflex%20Chemical%20Resistant%20Gloves.pdf
4. http://www.aps.anl.gov/Safety_and_Training/User_Safety/gloveselection.html

viii. Inspect gloves before each use; Do not use damaged gloves; Do not re-use disposable gloves that have become contaminated with hazardous chemicals;

ix. Use appropriate respiratory protection when air contaminant concentrations are not sufficiently restricted by engineering controls; Before use, inspect the respirator for wear or defects; Contact Safety Services for fit testing before wearing a respirator;

x. Avoid use of contact lenses in the laboratory unless necessary; if they are used, inform supervisor so special precautions can be taken;

xi. Use any other protective and emergency apparel and equipment as appropriate;

xii. Remove PPE, and wash areas of exposed skin with soap and water before leaving the laboratory, or upon significant contamination;

xiii. Do not wear potentially contaminated PPE out of the lab and into public areas, which could potentially spread contamination. (Ex: elevator buttons, door handles.

X. Signs and Labels (Hazard Communication)

A. A laboratory placard at the entrance to the lab will show the general type of hazards present (i.e. radioactive, biohazard, etc…) and will list the daytime and after hours contact information for a person responsible for the lab. To request or update a placard contact Safety Services;

B. Location signs for safety showers, eyewash stations, other safety and first aid equipment, and exits shall be prominent;

C. Warning signs shall be posted at areas or on equipment where special or unusual hazards exist;

D. Manufacturer's labels on incoming containers must not be removed or defaced. Upon receipt of a chemical, the date received, and the name of the responsible researcher shall be written on the container;

E. If chemicals from commercial sources are repackaged into secondary containers, the new containers shall be labeled with all essential information from the original container. At a minimum this must include the identity of the material(s) and the hazards present. The exception to this rule is when solutions are used up entirely during the work shift in which they were made;

F. Waste collection containers shall be labeled with the contents, hazard, name of responsible person, and the date waste collection began.

XI. Safety Equipment

A. The following equipment shall be available to all members of the laboratory:

i. An easily accessible drench-type safety shower;

ii. An eyewash fountain;

iii. A fire extinguisher;

iv. Respiratory protection, if needed, (e.g. mask, face shield)

v. Fire alarm and telephone for emergency use nearby.

B. Equipment shall be used only for its designed purpose;

C. Eye wash fountains should be tested by lab personnel for usability (water flows out of eyewash when turned on) once a week. Eyewashes and safety showers will be formally tested for flow rate and temperature at least once per year by TTUHSC Safety Services.

XII. Fume Hoods

A. Fume hoods shall be used for operations with a potential release of toxic or harmful chemical vapors or dust;

B. Personnel chemical exposures must not exceed the Permissible Exposure Limits (PELs) established by OSHA. Laboratory operations conducted in a properly operating fume hood are unlikely to result in excessive airborne exposures;

C. Materials stored in fume hoods should be kept to a minimum, and not allowed to obstruct vents or air flow;

D. The sash should be positioned below the worker's chin in order to provide protection from hazardous vapors;

E. Chemical fume hoods will be formally inspected by Safety Services on a regular basis;

F. Each hood should have a continuous monitoring device to provide constant visualization of hood performance. A simple way to accomplish this is to tape a small strip of paper to the bottom of the sash so that it can be seen being pulled into the hood by the air flow;

G. If the hood does not function properly, it is the responsibility of the Principle Investigator to contact Plant Operations for repair;

H. Fume hoods shall not be used as a means of chemical disposal. Do not allow chemicals to evaporate in the fume hood.

XIII. The Laboratory Facility

A. General laboratory ventilation should:

   i. Ensure that laboratory air is continually replaced in order to prevent buildup of any contaminants;

   ii. Not be relied upon for protection from toxic substances released into the laboratory;

   iii. Provide negative pressure relative to non-laboratory areas. Laboratory doors should not be propped open, as this disrupts the air balancing.

B. Hazardous chemicals may only be used in laboratory facilities or areas specifically designed for such work. Hazardous chemicals should never

be used in areas lacking appropriate infrastructure and ventilation, such as offices, break rooms, hallways or stairwells, etc…

C. Hazardous chemicals should never be used or stored in carpeted areas.

XIV. Accidents and Spills

A. **Minor Spills** (within the clean-up abilities of the lab)

Each lab should have access to a chemical spill kit, and shall use their kit to promptly clean up small spills, following the below guidelines:

i. The first to be aware of the spill shall notify others in the immediate area of the spill;

ii. Consult SDS for information on appropriate measures;

iii. Promptly clean up spills, using appropriate protective apparel and equipment. Collect the spilled and clean-up materials, and properly dispose of waste.

B. **Major Spills** (beyond the capabilities of the lab to clean up safely)

i. Take measures to stop the spread – if safe to do so;

ii. Evacuate the area, and prevent others from entering the spill area;

iii. Activate the nearest fire alarm if there is an uncontrolled open flame, uncontrolled compressed gas release, or any situation which poses an imminent threat to health or safety;

iv. Isolate the spill by closing doors to the area;

v. Contact Safety Services who will activate an emergency response team, such as police and fire departments. After normal business hours, call 9-911 directly.
Be prepared to give the location of the spill, the type and amount of material spilled, and the status of any injuries. Unless instructed otherwise, stay at this location until a representative of the response team arrives;

vi. Assess if anyone working in the area was exposed. If an exposure occurred, see below on Exposures;

vii. Notify the laboratory supervisor, or principal investigator.

C. **Exposure**

If injury or exposure is severe, seek immediate medical attention.

i. Eye Contact
    1. Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention;

ii. Ingestion
    1. If toxic, immediately seek medical attention;

    2. Locate the SDS and read and the recommendations followed regarding ingestion;

iii. Skin Contact
    1. Promptly flush the affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention.

XV. Chemical Waste

A. Assure that the plan for each laboratory operation includes provisions and training for waste disposal;

B. Collect chemical waste in receptacles labeled with the date collection began, and an itemized list of contents;

C. Waste collection containers must have a cap in place at all times except when actively filling or discharging the container. It is not acceptable to leave a funnel in a chemical waste container when it is not in use;

D. Do not discharge to the sewer concentrated acids or bases; highly toxic, malodorous, or lachrymatory substances; or any substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage or obstruct flow;

E. Indiscriminate disposal by pouring waste chemicals down the drain or adding them to mixed refuse for landfill burial is unacceptable;

F. Fume hoods shall not be used as a means of disposal for volatile chemicals;

G. Disposal by recycling or chemical decontamination should be used when possible;

H. To request a chemical pick up from Safety Services for proper disposal, complete an on-line Request for Transfer of Chemicals, located on the Safety Services webpage;
https://www.ttuhsc.edu/admin/safety/training/services/chemical.aspx

I. All policies for waste disposal are outlined in the TTUHSC *Regulated Waste Disposal Manual,* which may be found on the Safety Services website. For any questions dealing with waste disposal, contact the Environmental division of Safety Services.

XVI. Chemical Hygiene Responsibilities

A. **The Principal Investigator (PI)**

The PI has ultimate responsibility for chemical hygiene within their lab. Specifically they are responsible for:

i. Providing laboratory specific information under the SOP section of the TTUHSC Laboratory Compliance Manual which will facilitate the protection of employees from the health hazards associated with hazardous chemicals in the laboratory. This information shall include appropriate safety measures, signs and symptoms of exposure, and methods and observations that may be used to detect the presence or release of a hazardous chemicals such as monitors (if applicable), visual appearance, or odor. This information must advise personnel that specific information is available for individual chemicals through SDSs;

ii. Providing specialized training applicable to the specific activities performed in the lab. This training for new or newly assigned personnel shall take place before the person works with or in an area containing hazardous chemicals;

iii. Providing additional information and training as different hazards or procedures are introduced, or new and significant information concerning hazardous chemicals is received;

iv. Implementing procedures for the safe use and handling of hazardous chemicals to reduce or eliminate exposure. These shall include all necessary engineering controls, administrative controls, PPE, emergency shut-down procedures, decontamination and spill response procedures, and appropriate waste disposal methods;

v. Providing all necessary protective equipment for laboratory employees, including information on their use and limitations;

vi. Registering with the appropriate TTUHSC oversight committees all use of highly hazardous chemicals, hazardous biological agents, recombinant DNA, animals, or human subjects;

vii. Providing appropriate information to physicians in cases of occupational exposure or suspected exposure. This information includes: identity of the hazardous chemical(s), conditions of exposure and quantities involved, and signs and symptoms of the exposure;

viii. Reporting accidents and near misses to Safety Services.

B. **The Laboratory Supervisor**

Has responsibility to oversee chemical hygiene in the laboratory. If the lab does not have a supervisor, these will fall to the PI. Specifically, the lab supervisor shall:

i. Ensure that workers know and follow the chemical hygiene rules, that appropriate protective equipment is available and in working order, and that appropriate training has been provided;

ii. Perform regular, formal chemical hygiene and housekeeping inspections including routine inspections of emergency equipment;

iii. Ensure that facilities and training for use of any material being ordered are adequate;

iv. Report lab accidents and near misses to the PI.

C. **Laboratory worker**
Each laboratory worker is responsible for his or her personal safety. Each lab employee shall:

i. Plan and conduct each operation in accordance with these chemical hygiene procedures;

ii. Develop good personal chemical hygiene habits;

iii. Follow all rules and guidelines imposed by the lab supervisor and/or PI;

iv. Ask questions when instruction or guidelines are unclear;

v. Report accidents and near misses to the lab supervisor or PI.

D. **The Chemical Hygiene Officer (CHO)**
Will be appointed or designated by the job title of "Section Manager for Laboratory Safety"

i. Serves as a consultant;

ii. Works with administrators and other personnel to develop and implement appropriate chemical hygiene policies and procedures;

iii. Monitors procurement, use, and disposal of chemicals used in the laboratories;

iv. Ensures that appropriate audits are maintained;

v. Helps project managers develop safe and adequate facilities;

vi. Knows the current legal requirements concerning regulated substances.