Chemical Hygiene Plan

Introduction

It is the policy of Southwestern University to implement safe lab and chemical hygiene practices in our laboratories within (Fondren-Jones Science, Olin Building and any other facility hosting a laboratory).

It is the goal of Southwestern University to minimize chemical exposures to people, property and the environment. To this end, we have established a Chemical Hygiene Plan (CHP) as required under OSHA 29 CFR 1910.1450, Appendix A.

Note: Children/minors are generally not permitted inside laboratories or other areas where chemicals are in use unless authorized by the Dean of Faculty and affected Science Chair with specific supervision and safety measures [age appropriate] to be implemented by the lab instructor.

Scope and Application

This Chemical Hygiene Plan establishes policies, procedures and work practices intended to protect employees from health and physical hazards associated with work involving chemicals, particularly in laboratories. It covers employees (including student-employees, technicians, lab instructors and researchers) who handle chemicals. It also covers laboratory students who may be handling chemicals as part of the educational process. This Chemical Hygiene Plan is available for review by any campus employee/student or his/her representative. It is the *responsibility of every person covered by this Standard to read and comply with the safety guidelines established in this Plan.*

Responsibilities

Chemical Hygiene Officer

The following employee(s) are designated for administering and helping to implement this Chemical Hygiene Plan (program oversight role) and will act as our Chemical Hygiene Officer (CHO): **[Insert name(s) of designated CHO]**

Specific responsibilities and on-site monitoring include [or may be shared] the following:

1. Help lab instructors identify the physical and health risks of the various chemicals used in laboratory facilities. Facilitate the inventory of all chemicals (upon receipt) into CHIMERA and provide access to Safety Data Sheets (SDS).
2. Help lab instructors implement policies and procedures to minimize the risks from the identified hazards. Communicate with lab instructors to help ensure the establishment of safe lab practices (SOP's) and add the SOP's to the Chemical Hygiene Plan as Appendix A.
3. Perform and document regular, chemical hygiene lab inspections, inspect fume hoods, including inspections of emergency equipment such as emergency eyewash stations, fire extinguishers, fire suppression systems. [NOTE: *Fire extinguisher and fire suppression system inspection and maintenance is the responsibility of Facilities Management*].
4. Coordinate with the EH&S Office to request and schedule annual on-site documented lab safety audits with recommendations to address safety concerns or deficiencies in work practices observed.

5. Assist lab instructors to help determine the proper level and type of Personal Protective Equipment (PPE) for lab operations. Provide access to SDS's with PPE recommendations via CHIMERA chemical inventory management system.
6. Help ensure that training has been provided to affected employees and students. Coordinate with the EH&S Office to request assignment of laboratory safety related training modules to employees (lab instructors) when hired as well as periodic refresher for all employees. Lab instructors are responsible to train their own students in lab safety practices.
7. Maintain a current knowledge concerning the legal requirements of the regulated substances handled in the labs and refer to this CHP routinely.
8. When deemed necessary (potential exposure to high hazard chemicals) that are not well controlled by chemical fume hoods or gloveboxes, arrange air monitoring industrial hygiene services for measurement and assessment to the permissible exposure limits (PELs). Coordinate and request this service from the EH&S Office. 29 CFR 1910.1000, Z-1 Tables, Z-2 Tables, Z-3 Tables

Laboratory Instructor/Supervisor/Lab Manager

If there is no designated CHO who routinely works in the Science Building (FJS) labs to perform these services, the responsibilities listed above will be assumed by each primary Laboratory Instructor for labs, chemical storage areas or hazardous waste storage areas under their control. **Regardless of a designated Chemical Hygiene Officer, all laboratory instructors hold the direct, day-to-day responsibility for chemical hygiene plan implementation.**

Laboratory Employees and Students

Lab instructors and affected students are individually responsible for conducting their laboratory operations in accordance with this Chemical Hygiene Plan and (accepted) chemical hygiene practices.

Institutional Activities

Each institutional activity involving chemicals should be identified by a specific task. Each task is defined through the identification of potential hazards associated with performing the task (lab experiment or process).

Monitoring

Due to the consistent presence of potential airborne hazards in a laboratory setting, lab instructors will routinely monitor for changes in air quality. This air quality check can be performed as follows: **Monthly,** lab instructors will evaluate the effectiveness of the specialty air handling equipment (fume hoods/biological safety cabinets) used to reduce or eliminate airborne contaminants. Use and visualization of Telltale strips on fume hood sash's, monitoring face velocity readings on sensor, observing any odors outside the fume hood from volatile solvents. Conducting **quarterly smoke tests** inside fume hoods is a very good visual method to evaluate hood effectiveness. Smoke tests can be assigned and conducted by the CHO. Fume hoods, point source fume eliminators, biological safety cabinets in the following areas shall be evaluated:

(Fondren-Jones Science)

Annual Fume Hood Inspection/Testing: See **Fume Hood Inspection Program**. Quantitative airflow measurements shall be taken on an annual basis - contracted to a specialized third party vendor. Processes that routinely use specific toxic chemicals that may produce chronic health effects shall be evaluated or monitored on a **monthly** basis using equipment to ensure the fume hood is effectively capturing chemicals.

In conjunction with Facilities Management, lab instructors and/or CHO will monitor Emergency Equipment for preparedness on a **monthly** basis. This equipment includes but is not limited to the following:

- Fire Extinguishers: Facilities Management has the lead role to ensure fire extinguishers are inspected on a monthly basis, repairs made if warranted and documented.
- Emergency Eyewash and Shower Stations: (Lab Manager, Lab Technician, Student Workers) implement eyewash program monthly inspections, flushing with completed reports and work orders for repairs.
- Smoke Detectors - Fire Suppression Systems: Facilities Management has the lead role with a 3rd party vendor to test and maintain smoke detectors and fire suppression systems.
- Spill Kits: Lab instructors are responsible to ensure their spill kits are full, labeled and readily available. CHO can include verification during lab inspections.

All test results will be documented, shared with affected lab instructors, Chairs and specific corrective action will be taken when the level of contaminant exceeds the applicable level (e.g., PEL, TLV, etc.). Consultation with the Director of EH&S is necessary to evaluate and help determine appropriate corrective action measures.

Laboratory Chemicals

Southwestern University stores, processes and handles many chemicals in its laboratory/laboratories. The following campus employees under our campus Hazard Communication Program as defined by 29 CFR 1910.1200 maintains a comprehensive list of all chemicals used in their laboratory/laboratories. These chemicals (inventory) are managed in CHIMERA web-based chemical inventory management system.

(Lab Instructors, Science Lab Manager)

In addition, a comprehensive inventory and reconciliation of laboratory chemicals shall be conducted annually with our chemical inventory management system CHIMERA. The following information should be included:

- Product/Chemical name and Product number, Manufacturer, type of container (eg. glass bottle)
- SDS (not MSDS) is assigned/attached by Chimera
- Location is entered (Room number and sublocation eg. flammable cabinet)
- Date Received is written on container when container is labeled with bar code label
- Date of Inventory is captured by Chimera when entered
- Quantity is captured by Chimera (each container has a unique bar code)

- CAS number is entered when applicable
- Primary hazards-assigned by Chimera

Chemical Procurement

Whenever a chemical is received for use in our campus laboratories, it is the responsibility of *lab instructors* to ensure that employees/students whose activity requires working with or around the chemicals receive information on the potential health hazards, proper handling, storage and disposal of the chemical.

Note: To control chemicals on campus, all chemicals should be delivered to a centralized receiving area and added and managed in our Chemical Inventory Management System - "CHIMERA".

Safety Data Sheet

Safety Data Sheets are to be maintained for all chemicals used in our campus laboratory and can be accessed through our chemical inventory management system (CHIMERA). **QR codes posted outside lab sports have a direct access to SDS for chemicals used in the specific lab.

Sample materials submitted for analysis or unknown materials received by our campus shall be handled according to routine practices. These practices include labeling, handling, storage and disposal procedures.

Stockroom Storage (Segregation) & Chemical Container Inspections

Bulk chemicals for use in the laboratory/laboratories shall be separated in a storage area that is clearly identified and well ventilated. Highly toxic chemicals and other chemicals whose containers have been opened will be placed in a secondary non-breakable spill container, such as a plastic or metal tray, in order to contain a spill or leak. Lab instructors/Lab Manager should follow accepted storage guidelines for chemical compatible groups. Separate incompatible chemicals from each other. Refer to NRC: *Prudent Practices in the Laboratory*.

An employee shall be assigned (Science *Lab Manager*) to inspect chemicals stored in the stockrooms for compatible storage practices, replacement, signs of deterioration, container integrity, and lids sealed on a monthly basis.

Chemical Transfer

The maximum size container used to store chemicals in our laboratory/laboratories is **4 Liters**. Chemicals that are received in larger quantities shall be placed in smaller appropriate containers and labeled accordingly prior to transfer to the laboratory. Chemicals that are transferred to the laboratories from the receiving area or stockroom storage shall be placed in an outside container or bucket prior to transfer. All chemicals

transferred to the laboratories from the receiving area shall be recorded in the chemical inventory (CHIMERA) prior to being used in the laboratories.

Any transfer of flammable liquids for *Class 1,2, 3 (flash point <100) between containers that are 4L or larger s*hould only be performed when the containers are properly grounded and bonded.

Laboratory Storage

Samples, unused chemical product and hazardous wastes shall be stored in separate locations and will remain segregated for storage purposes.

- **Samples -** Upon receipt, samples shall be placed in appropriate containers, labeled and stored adjacent to the area where analysis will take place. Upon completion of the analysis, samples will be moved to a post-analysis storage location. Pre-analysis and post-analysis samples are stored in various locations throughout the laboratory that are labeled accordingly.
- **Chemical Products -** Corrosive substances shall be stored below eye level. Flammable substances shall be stored in approved flammable cabinets. Reactive and incompatible substances shall be stored separately from each other. In all cases, products shall be labeled and appropriate personal protective clothing and equipment employed prior to handling.
- **Hazardous Waste -** All containers must be of an appropriate type, clearly labeled and stored with compatible materials. Hazardous wastes should NOT be stored in chemical fume hoods due to causing less effective functioning of the safety features. Hazardous waste should be stored in designated storage cabinets (ideally under fume hoods in a vented cabinet - *labeled as hazardous waste satellite storage area*) and when full, transferred to the hazardous waste storage room FJS 346. All containers must be properly labeled, dated and entered on Southwestern's waste disposal forms. Follow Southwestern's Hazardous Waste Generator Program.
- **Handling Procedures -** All laboratory users will minimize personal and co-worker exposure to the chemicals in the lab. Specific precautions include the following:
    - A chemical mixture will be assumed to be as toxic as its most toxic component. Look for substitution possibilities wherever possible.
    - Laboratory users will become familiar with the signs and symptoms of exposure to the chemicals they work with and will understand and apply precautions necessary to minimize exposure.
    - Eating, drinking and smoking are prohibited in the areas where laboratory chemicals are present. All users will thoroughly wash their hands after handling chemicals. Food and drink will not be stored in chemical storage areas, such as cabinets or refrigerators.
    - All users will maintain their assigned areas in a neat and orderly manner and will ensure that all chemical containers are labeled with the chemical name and appropriate hazard warning.
    - Mouth suction for pipetting or starting a siphon is prohibited.
    - Use the personal protective equipment provided at all times, even for minor work. Avoid skin contact with chemicals.

- When an employee or student must work alone in the laboratory - (off-hours) that individual shall contact Campus Police at 512-863-1944 to inform them of their name, lab # and estimated start and completion time. This is to inform Campus Police to perform a site visit to help increase the level of safety for that individual.

Equipment Usage

- Laboratory equipment should only be utilized for its intended use.
- Glassware should be handled and stored in such a manner as to minimize breakage. Dispose of broken glassware in the broken glass container. Use tools as necessary to retrieve items from the broken glass container. Never use bare hands.
- Marked waste receptacles should be used to dispose of any waste chemicals.
- Equipment should be inspected periodically to ensure continued performance as designed. If the equipment is not working properly, the laboratory supervisor should be notified and the equipment removed from service.
- Fume hoods should be inspected daily by users to be sure airflow is adequate (~80 to 100 fpm at working height) to protect lab users from exposure to toxic vapors.
- Fume hood inspection/calibration services should be performed on an annual basis by a qualified third party vendor to ensure operational status and adequate face velocity. Science lab manager/EHS should coordinate this inspection process with Facilities Management and follow up on corrective actions noted.

Permissible Exposures

Southwestern University requires that exposures to chemicals not exceed permissible exposure limits (OSHA PEL's) specified under 29 CFR Part 1910 Subpart Z and the 28 substance-specific standards. In instances where this threshold of *less than* the PEL is exceeded or expected to be exceeded, engineering controls, modified work practices and/or personal protective equipment should be employed.

Special accommodations for individuals with compromised immune systems, chemical sensitivity or who are pregnant can be requested. Personnel (faculty/staff/student) can make requests for special accommodations to avoid or reduce chemical vapor exposure. Lab instructors are requested to provide reasonable accommodations for these requests.

Particularly Hazardous Substances

Our campus recognizes that certain chemicals are considered "Particularly Hazardous Substances," and additional controls shall be employed whenever use of these substances is required. Particularly Hazardous Substance chemical classes include the following:

1. Carcinogens—substances that cause cancer in organisms.
2. Reproductive Toxins—substances that affect reproductive capabilities, including chromosomal damage.
3. Embryo Toxins—substances that affect embryos and fetuses.

4. Severe Chronic Toxicity—substances that are toxic when exposed to a small amount over a long period.
5. Severe Acute Toxicity—substances that are toxic when exposed to a large single dose.

Lab Instructor/Principle Investigator (makes request for review) handling or otherwise using "Particularly Hazardous Substances" (PHS's) should obtain written authorization from the Chemical Hygiene Officer, Department Chair and review by EH&S Office prior to engaging in work with the substance. These substances should be back dated for existing PHS's. The following chemicals found at Southwestern University are classified as *"Particularly Hazardous Substances."*

- Carcinogens
- Reproductive Toxin
- Embryo Toxins
- Severe Chronic Toxicity
- Severe Acute Toxicity

Special Handling Procedures

Chemicals with high toxicity or are possible/probable carcinogens or reproductive toxins should be handled with extra precautions and clearly labeled.

Extra consideration for lab use should be taken by principle lab instructor to determine specific personal protective equipment, specific lab equipment use such (inside a properly functioning fume hood or biological safety cabinet). Lab instructors should clearly communicate the special hazards listed above to any lab personnel potentially exposed. In addition, for lab use with reproductive toxins, all individuals, especially those who are pregnant or are seeking to become pregnant and/or their partners, should understand hazards of all chemicals/biological agents by discussing with the lab instructor, carefully reviewing the SDS and other data. Be extra cautious to protect yourself from exposure by properly using the recommended PPE and engineering controls (hoods) and follow very good lab and hand hygiene techniques. Lab instructors should attempt to honor reasonable accommodations from concerned individuals if extra precautionary measures are requested.

Work with particularly hazardous substances requires the use of special handling procedures. These include the following:

- Establishment of a designated area for the use of high hazard substances
- Signage and access control to the designated high hazard work area
- Containment devices, such as glove boxes
- Isolation of contaminated equipment
- Special attention to good laboratory hygiene
- Prudent transportation of particularly hazardous substances, including minimizing the use of open containers and use of secondary containers.
- Specific planning for any spills or leaks or response actions in event of a spill

- Specific storage and waste disposal practices

Personal Protective Equipment

Southwestern University employs the use of engineering controls (chemical fume hoods, biological safety cabinets, laboratory ventilation) whenever feasible to reduce exposure or potential exposure to employees and students. Personal protective equipment is the last line of defense and should be selected based on hazards of the chemicals/processes.

All containers marked with the Biohazard Label shall be handled using universal precautions (see our Bloodborne Pathogens Control Plan).

Personal Protective Glove Selection

Due to the wide variety of chemicals utilized in our laboratories, the following guidelines shall be followed with respect to glove selection. The supervising lab instructor shall determine which material(s) provides the most desirable protection from each of the chemicals utilized in the laboratories by consulting with recognized glove selection charts or in collaboration with the CHO. The Degradation/Permeation Time Key for each chemical will be used to determine which material provides maximum protection and will include the length of time the material provides protection.

This glove selection chart is prominently displayed as a point of reference for employees/students in corridor bulletin boards and chemical stockroom. It is the responsibility of the CHO to display and maintain this chart. Contact the EH&S Office for assistance.

Gloves are stored in the following area(s): Each laboratory, chemical storage rooms, hazardous waste storage room.

Other Personal Protective Clothing and Equipment

When appropriate or based on risk of chemical exposure, employees and students working in laboratory areas shall wear laboratory coats. Employees and students shall wear appropriate protective eyewear and lab coats/aprons or chemical resistant lab aprons (for work with strong corrosive agents) or flame resistant lab coats/aprons (for work with pyrophoric substances). It is the responsibility of each lab instructor to assess and ensure proper PPE is worn in their laboratory.

Lab coats, aprons and protective eyewear are stored in the following area(s): Each laboratory.

Disposal of Personal Protective Clothing and Equipment

Upon completion of a specific task, or at the end of each day's activity, employees and students are responsible for disposing of "disposable" contaminated personal protective equipment in appropriately labeled containers designed for such disposal.

Restocking Personal Protective Clothing and Equipment

The Chemical Hygiene Officer or Science Lab Manager shall be responsible for restocking personal protective clothing and equipment. Any malfunction or inappropriate breakdown of protective clothing or equipment should be immediately reported to the CHO. Department Chairs are responsible for assessing personal protective equipment use in their department and annually budgeting for this expense.

Housekeeping

Due to the hazards associated with laboratory work, safe housekeeping practices are established at Southwestern University**.** The CHO or Lab Manager is responsible for routine inspections of laboratory areas to determine if proper housekeeping practices are being employed by lab instructors or users. In addition, the CHO will perform a formal laboratory housekeeping and chemical hygiene inspection annually**.** Results of these inspections shall be documented on an inspection form.

Periodic inspections by the EH&S Office will also be conducted that cover a diverse range of lab safety, hazard communication and hazardous waste procedures. Results of these inspections will be documented in e-report form and submitted to Department Chairs for follow-up corrective actions by affected lab instructors.

The following housekeeping policies are to be adhered to by all employees and students at all times:

A. Work areas shall be kept as clean as possible at all times.

B. Upon completion of the activity, it is the responsibility of employees and students to clean their areas of all chemicals and equipment.

C. Chemicals shall be appropriately labeled and stored at all times when not in use.

D. Equipment and materials shall be appropriately stored at all times when not in use.

E. Any spilled materials shall be promptly cleaned up and disposed of in accordance with proper procedures. If individuals are not sure of those procedures, they should ask their supervisor.

F. Hazardous waste shall be disposed of in accordance with campus standard operating procedures.

G. Unlabeled containers shall be appropriately labeled upon discovery. Whenever the contents of the container is not known, the container shall be labeled as an unknown, moved to the pre-analysis storage area and an analysis of the contents shall be performed and the container labeled accordingly. Under these circumstances, the unknown container shall be handled as if the contents were highly toxic and the highest level of personal protection available in the laboratory shall be used.

H. Chemicals and materials no longer needed shall be disposed of appropriately and promptly.

I. Floors shall be regularly swept and cleaned. Rugs or other floor coverings that are not specifically designed for laboratory work shall not be permitted.

J. Exits and access to emergency equipment such as eyewash stations and fire extinguishers shall never be blocked.

K. Never store equipment or materials in a hallway or stairway.

L. Eyewash stations should be inspected following Southwestern's Emergency Eyewash Program (forms) on a monthly basis to ensure good working order. This inspection is the responsibility of the CHO or Lab Manager. All other safety equipment shall be inspected monthly by the CHO/Lab Manager or Lab Instructors.

M. All glassware shall be promptly cleaned and stored upon completion of use. Any damaged/broken glassware shall be discarded in an appropriate container.

Chemical Spills, Releases and Accidents

Hazard communication signs (GHS Pictograms) will be displayed at lab entrance doors. Telephone numbers of the laboratory supervisor, campus security and emergency response personnel will be posted at the lab entrance and near the telephone, if the lab is so equipped. The list is updated as often as there are any changes.

In the event of a fire, the safety of all lab occupants is the foremost consideration. If the fire is very small, it can be extinguished by a portable extinguisher, assuming training has been provided in the use of an extinguisher. Only make an effort to put the small fire out after emergency responders (911) are called and the rest of the personnel in the lab are evacuated and there is not a significant risk of smoke exposure.

In the event of a spill or leak, the level of response will be dependent on the type and size of the release. All labs should stock spill media kits designed to capture spills related to the chemicals in use. The CHO, EH&S Office and Department Chair should be notified and notify designated first responders (call 911) if warranted (describe chemical and the extent of the spill).

In the event of skin contact between a lab worker or student and a chemical, flush the skin with cool flowing water for fifteen (15) minutes (or according to SDS). All users should be familiar with the location and operation of the emergency eyewash systems and emergency showers. Notify the laboratory supervisor, CHO, EH&S Office and Department Chair as soon as possible for further instructions.

Medical Surveillance

Note: Before undertaking a program requiring this level of medical monitoring, the proposed medical surveillance should be reported to EIIA for the underwriter's approval. Depending on the type of chemical, the frequency of use and the duration of use, it may be necessary to provide medical surveillance for employees and students.

The following operations when conducted may expose employees above their permissible exposure limit (PEL) and may require the implementation of our Medical Surveillance Program.

NA

Medical examinations shall be provided annually to all affected laboratory users unless the attending physician determines otherwise. Employees and students enrolled in our Medical Surveillance Program shall be provided an exit physical upon termination of employment, reassignment of duties, retirement or whenever there is a change in exposure level.

The CHO shall be responsible for coordinating the Medical Surveillance Program for employees and students.

In addition, examinations will be provided to all affected laboratory users under the following conditions:

- Whenever a user develops symptoms associated with exposure to a hazardous chemical to which the user may have been exposed in the lab.

- When exposure monitoring reveals an exposure level routinely above the action level or PEL for an OSHA-regulated substance, for which there are exposure monitoring and medical surveillance requirements.
- Whenever an event such as a spill, leak or other event takes place that increases the likelihood of a hazardous exposure.

Employee/Student Lab Safety Training

Southwestern University is committed to accident prevention and providing safety training to employees and students. Training will include *OSHA Hazard Communication* training (OSHA 29 CFR 1910.1200). Lab instructors are responsible to provide site and chemical specific lab safety training/instruction to their students. Chemical Hygiene Officer or Lab Manager should coordinate various lab safety training assignments with the EH&S Office (Vector Solutions on-line platform).

The **following topics** may be provided on a periodic basis:

- *Hazard Communication (GHS)*
- *Science Lab Safety*
- *Science Laboratory Chemical Spills*
- *Safety Data Sheets*
- *Personal Protective equipment (PPE)*
- *Fire Extinguisher Safety*
- *Southwestern's Chemical Hygiene Plan (CHP)*
- *Southwestern's Hazardous Waste Generator.*

The following information will be conveyed to employees and students who attend training under this Standard:

A. The contents of OSHA's 29 CFR 1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories Standard.

B. The physical and health hazards associated with the chemicals found in our laboratories and the measures employees are required to take to protect themselves from these hazards, including procedures for employing appropriate work practices, emergency procedures and personal protective equipment.

C. Signs and symptoms of exposure to the chemicals utilized in our laboratories.

D. Reference to Standard Operating Procedures (SOPs) for handling chemicals in our laboratories.

E. The details of our campus Chemical Hygiene Plan including location and availability of the Plan.

F. The location of Safety Data Sheets (SDS's) and other references for information on hazards, safe handling, storage and disposal of chemicals found in our laboratories.

G. The permissible exposure limits for OSHA-regulated substances and the recommended exposure limits for other hazardous substances found in our laboratories.

H. Methods employed by our campus to detect the release or presence of a hazardous chemical such as monitoring, visual appearance or odor.

I. Good laboratory work practices.

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