LSU Health NEW ORLEANS

CHEMICAL HYGIENE PLAN

July 26, 2011

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Emergency Procedures

Response to emergency situations must be conducted in an effective, timely manner to preserve life and property. Information on emergency response at LSUHNO can be found at the following link http://www.lsuhsc.edu/emergencypreparedness/

Contact EH&S for Spill Response or questions regarding spills at 504-568-6585 or via email at safety@lsuhsc.edu.

In the event of an actual emergency or for immediate attention, contact University Police at 504-568-8999.

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INTRODUCTION

The Chemical Hygiene Plan (CHP) is a requirement of Occupational Health and Safety Administration (OSHA) regulation 1910.1450 - Occupational exposure to hazardous chemicals in laboratories. Occupational Safety and Health Administration (osha.gov). The state of Louisiana's Office of Risk Management requires elements of the plan.

The CHP provides guidance on the safe and proper use, handling, and storage of hazardous chemicals in laboratories, which is necessary to protect personnel from potential health and physical hazards and keep chemical exposures below specified limits.

Laboratory workers must be aware of and understand all elements of the CHP. New employees should review the CHP and receive appropriate safety training before beginning work with hazardous chemicals. The CHP must always be available to all laboratory workers.

RESPONSIBILITIES

Environmental Health and Safety (EH&S)

EH&S is responsible for providing technical information and program support to assist Principal Investigators and Lab Supervisors in complying with the EHS 400.13, Laboratory Inspection Program.

EH&S will maintain the CHP. Specific responsibilities include:

- Provide general and laboratory safety training.
- Provide guidance and technical assistance with handling, storing, and safely disposing of hazardous chemicals.
- Conduct exposure assessments and evaluate exposure control measures as necessary.
- Maintain employee exposure records.
- Conduct laboratory safety inspections per EHS400.13, Laboratory Inspection Program guidelines.
- Emergency response for large chemical spills.

Chemical Hygiene Officer (CHO)

The CHO is responsible for providing guidance for complying with the CHP. Specific responsibilities include:

- Assist laboratory personnel with the development of lab-specific chemical hygiene procedures and practices.
- Monitor the use and disposal of chemicals used in the lab.
- Maintain current knowledge concerning the legal requirements of regulated substances in the laboratory.
- Participate in the investigation of serious accidents involving hazardous chemicals.

Supervisor/Principal Investigators (PIs)

The Supervisor/PI is the primary person responsible for CHP compliance in the laboratory. These responsibilities include:

- Ensure laboratory workers are familiar with the requirements of the CHP.
- Identify hazardous conditions or operations in the lab, determine safe procedures and controls, and implement and enforce standard safety procedures.

- Ensure personnel are trained at least annually on specific chemical hazards present in the lab and maintain documentation of this training.
- Perform annual chemical inventory review and ensure annual attestations are complete in theonline EH&S compliance software, currently Safety Stratus.
- Maintain printed/physical copies of SDS if online copies are unavailable.
- Ensure that personal protective equipment (PPE) is available and used in accordance with Policy EHS-400.03, Personal Protective Equipment.
- Develop standard operating procedures (SOPs) in accordance with this policy. See Attachment A for an example.

Employees

Employees are responsible for applying sound chemical hygiene practices as outlined in the CHP. These responsibilities include:

- Complete initial laboratory safety training via **Compliance and Training System (CATS)** and all laboratory-specific training prior to commencing any chemical work.
- Follow the use and handling procedures listed on chemical labels and in Safety Data Sheets (SDS).
- Follow the guidance and requirements of the CHP and any lab-specific SOPs.
- Use PPE as required per the developed lab-specific procedures.
- Promptly report accidents and unsafe conditions to the Laboratory Supervisor/PI per EHS 400.06, Incident/Accident Reporting and Investigation Policy.
- Prior to beginning work, familiarize yourself with the location and use requirements of the lab-assigned chemical spill kit, fire extinguishers, emergency showers, and eye wash stations.

TRAINING

General Training

All newly hired laboratory personnel must take General Safety and Laboratory Safety training via the Office of Compliance Programs' CATS system. Hazard communication is a component in each of these training modules.

Laboratory Specific Training

All laboratory personnel must receive laboratory-specific training at an initial assignment and at least annually after that. Training is also required before assignments involving exposure to new hazards or when safety performance dictates the need for retraining. Supervisors/PIs are responsible for providing laboratory-specific training to their lab personnel to address the specific chemical hazards present and emergency procedures specific to the laboratory. Training must be documented using the Laboratory-Specific Training Checklist and should include:

- Contents of the Occupational Exposure to Hazardous Chemicals in Laboratories Standard.
- Contents and location of this CHP.
- Review of any SOPs involving hazardous chemicals.
- Exposure limits for hazardous chemicals used in the lab.
- Signs and symptoms associated with exposure to chemicals used in the lab.
- The location and availability of known reference material on the hazards, safe handling, storage, and disposal of hazardous chemicals found in the laboratory including, but not limited to, SDS instruction provided by the chemical supplier.
- How to read and interpret SDS.

- Methods to detect the presence or release of chemicals.
- Physical properties and health hazards of chemicals used in the laboratory.
- Measures that laboratory personnel can take to protect themselves from chemical hazards.
- Procedures for emergency response and spill control.

LABORATORY SECURITY

To minimize the probability of theft and chemical exposure to an untrained visitor, the laboratory must always remain secure. In general, all laboratories should:

- Close and lock laboratory doors when no one is present.
- BSL2 or higher lab door(s) shall be closed during active lab work.
- Do not leave hazardous materials unattended at any time when not secured.
- Restrict access to the laboratory to authorized personnel only.
- Report any missing inventory to the Laboratory Supervisor/PI.
- Prohibit the use of lab space, materials, and equipment without the knowledge and approval of the lab supervisor or PI.
- Maintain the chemical and biological inventories via Safety Stratus.
- Maintain an equipment inventory.

HAZARD COMMUNICATION

Door Signs and Labels for Chemicals

All laboratories are required to have door signs. Signs on laboratory doors communicate the hazards associated with a laboratory to workers or visitors before they enter the laboratory. Door signs also communicate who to contact in the event of an emergency. Labels are a primary source of information concerning hazardous material identification, hazards, and storage requirements. The EH&S department provides all door signage and labels.

For more information on door signage and manufacturer's or secondary container labeling, see EHS 400.12, Hazard Communication Program.

Chemical Inventory

Maintaining an accurate inventory of the chemicals present ensures that first responders to chemical incidents are aware of potential hazards in the laboratory. LSUHSC uses Safety Stratus, a web-based compliance and inventory database, to manage chemical data, perform assessments, and generate reports. Safety Stratus allows PIs/Supervisors to access and monitor their chemical inventory. The inventory should be updated when a chemical is added, no longer used, or when there is a significant change in the quantity of any chemical.

For more information, see EHS 200.07, Chemical Inventory and Chemical Procurement, Inventory, and Security Policy

SDS

OSHA 29 CFR 1910.1200, Hazardous Communication Program, requires that SDS(s) be available to all employees for each hazardous chemical used in their work area. Safety data Sheets (SDS) were previously known as Material Safety Data Sheets (MSDS), and either one may appear on the LSUHSC campus. An SDS summarizes information about the chemical, including chemical components, hazard identification, first aid, spill response, firefighting measures, incompatibilities, safe handling and storage requirements, and disposal guidelines.

Laboratory supervisors/PIs shall ensure copies of SDSs for all hazardous chemicals in their laboratories are available in hardcopy or on a computer hard drive. To obtain an SDS, contact the chemical manufacturer, supplier, or distributor or reference the manufacturer's website.

For more information about SDSs and the LSUHSC Hazardous Communication Program, see EHS 400.12, Hazard Communication Program.

GENERAL PRINCIPLES FOR WORKING WITH LABORATORY CHEMICALS

Perform a Hazard Assessment

Before starting new procedures, the Supervisor/Principal Investigator shall initially assess potential hazards, which shall include, but is not limited to, review of data from monitoring of similar operations, SDS reviews, procedure reviews; consideration of the potential for skin and eye contact; reports of unusual odors, irritations, or other signs or symptoms of potential exposures. The Laboratory Pre-Commission checklist should be utilized as an assessment tool.

Contact the EH&S department to perform a formal health hazard evaluation (HHE) where the initial assessment indicates a reasonable potential for a health and safety hazard. When the HHE identifies a hazard, recommendations for implementing the appropriate protective measures, including engineering/administrative controls and personal protective equipment, will be determined.

After completing an HHE that has identified a hazard and recommended the implementation of exposure control measures, the laboratory should develop laboratory-specific standard operating procedures that incorporate the necessary and appropriate use of hazard controls and work practices.

Exposure Monitoring

Regular environmental monitoring is not usually warranted in labs because chemicals are typically used for relatively short periods and in small quantities. However, exposure monitoring as part of an HHE or required by 29 CFR 1910.1450 may occur when:

- Using hazardous chemicals in quantities and for frequencies and durations of significance.
- Using highly toxic chemicals with low threshold exposure limits.
- Regular use of an OSHA-regulated substance can create exposures in excess of an action level (AL) or permissible exposure limits (PEL). The AL and PELS for OSHA-regulated substances are found in 29 CFR 1910.1000, Toxic and Hazardous Substances.
- Laboratory personnel exhibit signs and symptoms of exposure to chemicals used or stored in their areas.

Minimize Chemical Exposures

Since few laboratory chemicals are without hazards, implement general precautions for chemical handling, storage, and disposal in all laboratories. Use of less hazardous materials, implementation of engineering controls whenever feasible, and use of personal protective equipment to avoid exposure to chemicals is encouraged. EH&S will perform exposure monitoring as appropriate.

Special Precautions When Working with High Hazard Materials

Take special precautions when performing laboratory work with any of the following chemical categories:

- Carcinogens.
- Reproductive toxins.
- Substances known to have a high degree of toxicity.
- Chemicals whose toxic properties are unknown.

These chemicals are considered high-risk materials and are treated as high-hazard chemicals. An initial hazard assessment shall be performed prior to working with all high-hazard chemicals. Additional provisions for working with high-hazard chemicals are described in EHS 200.09, High Hazard Chemical Policy.

Standard Operating Procedures (SOPs)

SOPs contain the practices and procedures required to protect employees' health and safety when working with hazardous chemicals in the laboratory. They provide specific instructions on how to perform a given task.

- Supervisors/PIs are responsible for reviewing all materials and substances in the laboratory.
- The supervisor/PI is responsible for developing and effectively implementing site-specific SOPs to handle all hazardous chemicals safely in their laboratory.
- Develop SOPs according to a process or procedure, classes of hazardous chemicals, or dangerous individual substances.
- Incorporate the results and recommendations of an HHE into all applicable SOPs.
- There is no specific format required, but SOPs shall:
    - Identify the methods or processes that will include using hazardous chemicals.
    - Identify the hazards associated with the chemicals.
    - Identify the training requirements of laboratory personnel.
    - Identify the PPE worn during the procedure.
    - Identify the equipment (e.g., fume hood, glove boxes, ventilation requirements, shields) required to minimize exposure.
    - Identify the necessary and available emergency equipment.
    - Describe specific, safe handling and storage requirements for chemical use.
    - Describe specific spill and cleanup procedures.
    - Develop specific procedures for waste disposal.
    - Identify necessary medical surveillance or monitoring.

Develop SOPs using the Template Form: Laboratory-Specific Standard Operating Procedures. Completed samples of SOPs are located on the LSUHSC EH&S High Hazard Chemical webpage. An alternative to using the SOP format is to conduct a Job Safety Analysis (JSA) on applicable jobs/tasks. A JSA is a systematic method of identifying hazards and control measures to safely perform a specific job or task. For more information on JSAs, see EHS 400.04, Job Safety Analysis Policy.

Standard Laboratory Work Practices

Laboratory employees should be alert to unsafe laboratory practices and conditions and immediately report such practices and conditions to the laboratory supervisor/PI. The supervisor/PI should correct unsafe practices and/or conditions immediately. The following are some basic tips that should be followed while working in the laboratory:

- It is strictly prohibited to eat, drink, chew gum, smoke, apply cosmetics, or take medication in the laboratory. These activities are not only against the rules but also pose a risk to the safety and cleanliness of the work environment. For more detailed information, please refer to the EH&S Laboratory Safety page.
- Do not smell or taste any chemicals.
- Avoid unnecessary exposure to all chemicals by any route.
- Laboratory equipment is to be used only for its intended purpose.
- Pipette chemicals using pipe bulbs or other appropriate equipment. Never pipet chemicals by mouth.
- Hands should be washed after working with chemicals, even when wearing gloves. Food and beverages should never be stored in lab refrigerators or chemical storage areas.
- Do not use laboratory water sources for drinking water.
- Appropriate laboratory attire is listed on the EH&S Laboratory Safety page.
- Avoid working alone in the laboratory. If working alone is unavoidable, arrange for periodic checks by personnel in adjacent laboratories or office areas.

LABORATORY FACILITY DESIGN, MAINTENANCE, AND USAGE

The engineering controls installed in the laboratory minimize employee exposure to chemical and physical hazards in the workplace and require proper maintenance. When designing a laboratory, be sure to include the following:

- An appropriate general ventilation system with air intake and exhausts should be located to avoid contaminated air.
- An adequate, well-ventilated stockroom/storeroom.
- The need for laboratory chemical fume hoods and biosafety cabinets (BSC's)
- Sinks.
- Other safety equipment includes emergency safety showers and eyewash stations.

Routine maintenance is essential to maintaining a safe laboratory. The Property and Facilities Department handles all maintenance functions, both routine and non-routine. Work requests should be submitted via the online work request system.

LABORATORY VENTILATION

General Laboratory Ventilation

Laboratories should have general ventilation for employee comfort and sufficient to supply air for chemical fume hoods and other local ventilation devices.

- Except for special circumstances, the air in laboratories should be under negative pressure with respect to the rest of the building, which helps to prevent odors and vapors from leaving the laboratory area.
- Direct airflow into the laboratory should come from non-laboratory areas and be exhausted to the exterior of the building.

- Laboratory air should be continually replaced, preventing an increase in the concentrations of toxic materials during the workday.

It's critical to note that general ventilation alone is not sufficient for protection from toxic and hazardous substances. Local ventilation devices, such as chemical fume hoods, are specifically designed to significantly reduce the exposure of laboratory workers to these hazardous substances.

Laboratory Chemical Fume Hoods

Local exhaust ventilation is one engineering method available to reduce the risk of a health hazard associated with the use of hazardous chemicals in the laboratory. Laboratory chemical fume hoods are the most common local exhaust found in the laboratory.

- The hood prevents hazardous vapors and dust from mixing with the general room air.
- Air from the room enters the front of the hood and exhausts through the back and top of the hood.
- When working in the chemical fume hood with the sash lowered to an appropriate working level, you can feel secure knowing that the hood protects you from chemical splashes, sprays, fires, and minor explosions.
- A certification sticker on the side of the face opening identifies the proper working height for the sash.
- If a chemical fume hood is not operating properly, or if it is not used properly, the airflow will be insufficient to capture and remove hazardous vapors and particulates, reducing the protection factor of the chemical fume hood.
- EH&S certifies fume hoods annually in accordance with ANSI/AIHA Z9.5, American National Standard Laboratory Ventilation Guidelines.

Ductless Chemical Fume Hoods

Ductless fume hoods recirculate exhaust air through filters back into the room; they shall not be used when working with volatile toxic materials. If ductless fume hoods are necessary, a schedule for changing filters shall be established and available.

Biological Safety Cabinet

The exhaust air from a biological safety cabinet (BSC) passes through scrubbers, HEPA filters, or other treatments before being released into the regular exhaust system. BSCs must be re-certified annually, and each time they are moved.

Volatile chemicals should only be used with a B2 BSC, where the exhaust is not re-circulated into the room. For additional details, visit the EH&S BSC SOP webpage or contact EH&S for BSC selection/questions.

Glove Box (Negative and Positive Pressure Units)

Negative-pressure glove boxes and glove bags are isolation units used when handling highly toxic chemicals, carcinogens, and biological select agents. Use positive-pressure units when protection from atmospheric moisture or oxygen is required. Toxic chemicals must not be used with positive-pressure units. Test these units regularly for leaks and ensure a shutoff valve and pressure gauge are available.

"Cold" or "Warm" Rooms

Temperature control rooms do not generally have fresh air ventilation; the air is recirculated. Never use highly volatile hazardous chemicals in these "cold" or "warm" rooms, as hazardous chemical concentrations can increase over time. Also, liquid nitrogen should never be stored in cold rooms, as oxygen displacement with nitrogen could cause an oxygen-deficient atmosphere.

MEDICAL CONSULTATION AND MEDICAL EXAMINATIONS

Employees shall receive appropriate medical support in association with workplace hazards. Medical evaluations might be required. For more information, refer to EHS 200.08, Respiratory Protection Program, and EHS 400.03, Personal Protective Equipment Policy. All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee and at a reasonable time and place.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Use PPE as a final means of barrier protection against hazards. It shall be fit for the individual and specific for the hazard. Employees must be trained in the use and selection of PPE before using it. For more detailed information on different types of PPE, see EHS 400.03, Personal Protective Equipment Policy.

Gloves

Care should ensure that the gloves chosen for a specific application are suitable. To make an informed decision regarding the type of glove to use to provide adequate protection, an SDSs and/or a manufacturer's glove compatibility chart should be consulted to ensure that the gloves that are worn would protect the wearer.

- EHS 400.03, Personal Protective Equipment Policy.
- Personal Protective Equipment (osha.gov)

Respirators

OSHA regulation 29 CFR 1910.134, Respiratory Protection, requires that all personnel required to wear a respirator must be assisted with properly selecting a respirator and receive a medical evaluation, fit testing, and training before a respirator can be worn. When respirator use is required to maintain exposure levels below permissible limits or short-term exposure limits, the EH&S Department will guide the selection and use of the respirator.

For more information on respirators, see EHS 200.08, Respiratory Protection Program.

BASIC LABORATORY SAFETY EQUIPMENT

Fire Extinguishers

Type ABC fire extinguishers are provided in or near each laboratory. EH&S routinely assesses

fire extinguishers for proper use conditions and oversees 3rd party state contractor annual evaluations on all pressure dry chemical portable extinguishers.

Safety Showers and Eye Wash Stations

Use emergency safety showers to drench the body in water to remove any hazardous material contamination. Use emergency eye wash stations to remove hazardous material contamination from the eyes and face. All laboratory employees should know the location of the nearest safety shower/eyewash station and shall, with frequency, check their functionality prior to working with hazardous materials. EH&S performs safety shower inspections biannually. For more information on safety showers and eyewash stations, see EHS 400.08, Emergency Shower and Eyewash Policy.

Chemical Spill Kits

EH&S provides basic spill kits to all laboratories, chemical storage areas, and other areas where significant quantities of chemicals are used or stored. A basic chemical spill kit contains absorbent pads, absorbent spill pillows, nitrile gloves, safety glasses, plastic bags, booties, sleeve covers, and instructions on what to do in case of a chemical spill. For more information on chemical spills, see EHS 200.02, Chemical Spill Response Procedures.

GENERAL HOUSEKEEPING

A clean, well-maintained work area is a pivotal contributor to safety. The following are some essential tips for maintaining good housekeeping in the laboratory:

- Establish a routine cleaning schedule for the work area.
- Work surfaces should be kept as clean as possible, with only those items needed for the immediate project.
- Clean all working surfaces at the end of each day.
- Clean all apparatus(s) thoroughly and return to storage upon completion of usage.
- Keep floors clean and free of tripping hazards.
- Clean, appropriately label, and return to storage upon completion of usage of all chemical containers.
- Store only the amount of chemicals needed.
- Properly dispose of chemicals that have reached their expiration date.
- Keep stairways, hallways, passageways/aisles and access to emergency exits clear.
- Do not block access to the fire extinguisher(s), emergency safety shower, and eyewash.
- Do not allow combustible material such as paper, cardboard boxes, or pallets to accumulate.
- Do not let material accumulate in laboratory hoods. Excess chemicals and equipment in the hood compromise the safety of this workspace and the ventilation provided.
- Do not overfill collection receptacles.

LABORATORY EQUIPMENT AND GLASSWARE

Principle Investigators are responsible for their specific laboratory equipment, including routine inspection for proper working conditions. After each workday or operation, thoroughly

clean and properly store equipment throughout the work area. In addition, the following procedures shall apply to the use of laboratory equipment and glassware:

- Only use laboratory equipment for its intended purpose.
- Handle and store glassware with care to minimize breakage.
- Immediately dispose of broken glassware in an appropriately labeled broken glass container constructed with corrugated cardboard or other puncture-resistant material.
- Shield evacuated glass apparatus to contain chemicals and glass fragments in the event of an explosion.

Inspect laboratory equipment on a periodic basis for safety defects and replace or repair as necessary.

CHEMICAL ORDERING AND STORAGE

The improper storage and handling of chemicals can result in a fire, explosion, or personal injury. EHS 200.05, Chemical Ordering and Storage Procedures provides general guidance for ordering and properly storing chemicals. Obtain more specific storage instructions from Safety Data Sheets (SDS), container labels, and chemical reference books.

COMPRESSED AND LIQUEFIED GAS CYLINDERS

Compressed and liquefied gases can present a variety of hazards due to their pressure and contents. Depending on the particular type of compressed or liquefied gas, there is a potential for simultaneous exposure to the following types of hazards:

- Decompression
- Flammability and explosion
- Asphyxiation
- Toxicity
- Cryohazard
- Physical hazard (weight)

EHS 200.03a, Compressed Gas Policy, provides general guidance for the receipt, storage, and transport of compressed gas. EHS200.03b, Cryogenic Liquid Policy, addresses the same for cryogenic liquids. For information on liquid nitrogen emergency preparedness procedures, see Liquid Nitrogen Emergency Preparedness.

SPILLS

The cleanup procedure for a spill will depend on its type and nature. Below are links to the procedures for chemical, biological, and radioactive spills.

Chemical Spills

Various hazardous chemicals are used throughout the LSU Health Sciences Center. Incidents involving hazardous chemical spills and exposures require prompt action by the responders to control chemical exposures to personnel and minimize impacts to the environment and

property. EHS 200.02, Chemical Spill Response Procedures, provides general guidance for a rapid, appropriate, and safe response to chemical spills.

Biological Spills
The LSU Health Sciences Center uses a wide variety of biohazard materials. For general guidance on responding to all biohazard spills quickly, appropriately, and safely, see EHS 300.02, Biological Spill Response Procedures.

Radioactive Spills
For information on radiation spill instructions, see EHS 100.04, Radiation Spill Response Procedures.

LABORATORY WASTE DISPOSAL

Chemical Waste:
Laboratory chemical waste is generally considered hazardous waste, which is regulated by the Louisiana Department of Environmental Quality (LDEQ). All laboratory personnel who produce hazardous waste are required to manage their waste per EHS 200.04, Chemical Waste Management Procedures.

Biological Waste:
For information on biohazardous waste disposal, see Waste Disposal Procedures.

Radioactive Waste:
For more information on radioactive waste disposal, see Waste Disposal Procedures.

RECORDKEEPING

Documentation and records will be kept to demonstrate compliance with applicable regulations. All exposure and medical records will be kept in accordance with OSHA 29 CFR 1910.1020, Access to Employee Exposure and Medical Records, and all inspection and training records will be kept for the current year and the prior three fiscal years.

INSPECTIONS

All supervisors/PIs and laboratory employees should routinely inspect their laboratory to ensure compliance with the CHP. In addition to this self-check, EH&S will perform periodic inspections in accordance with EHS 400.13, Laboratory Inspection Program.