UNIVERSITY OF NEBRASKA AT OMAHA
ENVIRONMENTAL HEALTH & SAFETY

UNO CHEMICAL HYGIENE PLAN

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UNO Chemical Hygiene Plan

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1. Purpose, Scope, and Responsibilities

A. Purpose

OSHA's Occupational Exposure to Hazardous Chemicals in Laboratories standard (29 CFR 1910.1450), referred to as the Laboratory standard specifies the mandatory requirements of a Chemical Hygiene Plan (CHP) to protect laboratory workers from harm due to hazardous chemicals. The CHP is a written program stating the policies, procedures and responsibilities that protect workers from the health hazards associated with the hazardous chemicals used in that particular workplace.

B. Scope

All UNO employees who work with hazardous chemicals must adhere to the requirements outlined in this CHP. Every employee is responsible for following safe work practices to protect themselves and all other lab personnel.

C. Specific Requirements

Standard operating procedures relevant to safety and health considerations for each activity involving the use of hazardous chemicals.

Criteria that the employer will use to determine and implement control measures to reduce exposure to hazardous materials [i.e., engineering controls, the use of personal protective equipment (PPE), and hygiene practices] with particular attention given to selecting control measures for extremely hazardous materials.

A requirement to ensure that fume hoods and other protective equipment are functioning properly and identify the specific measures the employer will take to ensure proper and adequate performance of such equipment.

Information to be provided to lab personnel working with hazardous substances include:

- The contents of the laboratory standard and its appendices.
- The location and availability of the employer's CHP.
- The permissible exposure limits (PELs) for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard.
- The signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.
- The location and availability of known reference materials on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, the Safety Data Sheets.

The circumstances under which a particular laboratory operation, procedure or activity requires prior approval from the employer or the employer's designee before being implemented.

Designation of personnel responsible for implementing the CHP.

Provisions for additional worker protection for work with particularly hazardous substances. These include “select carcinogens,” reproductive toxins and substances that have a high degree of acute toxicity. Specific consideration must be given to the following provisions and shall be included where appropriate:

- Establishment of a designated area.
- Use of containment devices such as fume hoods or glove boxes.
- Procedures for safe removal of contaminated waste.
- Decontamination procedures.

The employer must review and evaluate the effectiveness of the CHP at least annually and update it as necessary.

Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.).

The physical and health hazards of chemicals in the work area. The measures workers can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect workers from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.

D. Responsibilities

Environmental Health and Safety
UNO Environmental Health and Safety (EHS) serves as the primary health and safety resource to assist laboratories in promoting best practices in safety and environmental performance. It maintains compliance with applicable federal, state and local regulatory requirements, agreements and permits, including implementation of each laboratory's specific CHP in compliance with the OSHA Standard 29 CFR 1910.1450. EHS is responsible for:

- Providing technical support and assistance in the areas of chemical safety, radiation safety, hazardous waste, biological safety, industrial hygiene, fire/life safety and environmental stewardship.
- Developing and implementing the University wide Laboratory Safety and Chemical Hygiene Plans. EHS reviews the program for regulatory compliance including federal, state, and city regulations, and represents UNMC to the various federal, state, and city regulatory and environmental agencies.
- Developing and implementing training and educational programs designed to improve the health and safety of the UNO community and to foster compliance with governmental regulations and professional standards.
- Conducting regular visits to laboratories to assist in compliance with the CHP.
- Implementing policies approved by the University administration.

Principal Investigator
The Principal Investigator (PI) is a faculty member or research scientist appointed by the University to conduct research. The PI has overall responsibility for safety and compliance in his or her laboratory, although the below responsibilities can be delegated to a competent designee(s) in the laboratory. The PI is responsible for:

- Ensuring that laboratory personnel have read, understand and adhere to the Laboratory Safety and Chemical Hygiene Plans including the Laboratory Assessment Tool.
- Ensuring that new laboratory personnel take all UNO Safety, Laboratory Safety, Chemical Safety, and all other applicable safety training at the time of hire or before involvement in laboratory research activities, and that refresher training is completed as required.
- Ensuring that current and new laboratory personnel receive adequate laboratory process and/or equipment-specific safety training from the PI before use.
- Ensuring that personnel are advised of applicable safety procedures when introducing new hazardous biological or chemical substances, radioactive materials, compressed gasses, equipment, and procedures.
- Ensuring that appropriate personal protective equipment (PPE) is available and used.
- Developing operating procedures to address a particular hazard or operation encountered in the laboratory. EHS may be consulted to aid in this effort.
- Ensuring that proper signage is present inside and outside the laboratory to identify where hazards may exist and update this information annually or whenever there are changes.
- Ensuring that containers are labeled so that laboratory personnel or emergency responders can determine the identity of the contents.
- Ensuring that the two contacts are listed on the laboratory sign and that the lab has provided 24/7 cell phone numbers for lab personnel who are available for immediate response in case of an emergency.
- Reviewing the laboratory's operating procedures, plans and other relevant safety procedures, whenever changes occur, but no less frequently than annually.
- Completing a Lab Closeout Checklist prior to any laboratory closeout, renovation, or move.

Laboratory Manager/Supervisor
The Laboratory Manager/Supervisor is a senior researcher appointed by the Primary Investigator (PI) or is the PI him/herself, who is responsible for all safety aspects of the laboratory's operations. The Laboratory Safety Manager is responsible for:

- Working with the PI and EHS to ensure laboratory personnel are informed of and follow the Lab Safety Manual, Chemical Hygiene Plan and all University, school, departmental and laboratory policies and procedures.

- Ensuring laboratory personnel conduct activities consistent with good laboratory practices.
- Ensuring that appropriate PPE is available and used.
- Ensuring that appropriate spill control material is available, and personnel are trained in its use.
- Ensuring that Safety Data Sheets (SDS) are accessible for all hazardous chemicals in use or storage.
- Instructing laboratory personnel on specific procedures and equipment.
- Ensuring that chemical containers are properly labeled and closed.
- Ensuring that chemical inventory is prepared, maintained and accessible electronically.
- Monitoring the procurement, use, and disposal of hazardous material.
- Advising Facilities personnel of potential hazards that might be encountered when they enter the laboratory.

Laboratory Personnel

Laboratory Personnel are individuals who work in the laboratory including PIs, research scientists, post-doctoral fellows, technicians, undergraduate and graduate students, visiting scientists, laboratory volunteers, support personnel, and glassware washers. All laboratory personnel are responsible for:

- Reviewing and applying the information in the CHP and all University laboratory policies and procedures.
- Knowing where SDS's are maintained and reviewing SDS's prior to use of hazardous materials.
- Taking all Safety, Laboratory Safety, Chemical Safety Training and other applicable trainings.
- Safely handling and disposing of chemicals.
- Using appropriate engineering controls (e.g., biological safety cabinet, chemical fume hood, radiation shielding) and PPE when working in the laboratory.
- Reviewing and understanding emergency response procedures.

Safety Leadership Team

The UNO Safety leadership Team (SLT) supports and advances UNO’s continued commitment to promoting best practices in safety and environmental performance in all education and research activities, while remaining compliant with applicable federal, state and local regulatory requirements, agreements and permits.

The SLT helps EHS to establish research safety and environmental program goals based on issues and objectives deemed to be priorities by Committee members representing UNO. These programs will be fundamental to the UNO Environmental Management System (EMS), which is based on the concept of continual improvement, whereby the University strives to enhance safety and environmental performance by establishing objectives and targets, and periodically monitoring performance against these targets.

2. Management of Hazardous Chemicals

A. The Occupational Safety and Health Act (OSHA)

Enacted in 1970, the purpose of this law is to assure, so far as possible, "safe working conditions" to "every working man in the country." This is accomplished by the issuing of basic safety and health standards, assigning OSHA employees to inspect workplaces, and forcing industry to reduce or eliminate job hazards by imposing fines for identified violations.

The Occupational Safety and Health Administration (OSHA) sets standards for worker exposure to hazardous substances and requires that such substances bear warning labels. It also mandates that employees be given training and other information on dangers posed by chemicals, and be given instruction as to how to use these chemicals safely. OSHA has the authority to inspect a workplace to determine whether it is in compliance with these regulations. In current practice, only a worker complaint or high worker injury rates as shown in company records will trigger an actual inspection.

Under SARA, the Secretary of Labor was directed to issue a final standard to protect the health and safety of employees engaged in hazardous waste operations. In 1989, OSHA issued this rule on Hazardous Waste Operations and Emergency Response (HAZWOPER), which represents the first comprehensive approach to protecting public and private sector employees involved in the business of handling hazardous waste materials. Many of the workers affected by this rule are employees of State and local governments.

B. General Classes of Hazardous Chemicals

The OSHA Laboratory Standard requires as part of the Chemical Hygiene Plan that provisions for additional employee protection be included for work involving particularly hazardous substances. These substances include “select carcinogens”, reproductive toxins, and substances which have a high degree of acute toxicity. The OSHA Laboratory Standard defines particularly hazardous substances as:

Carcinogens – A carcinogen is a substance capable of causing cancer. Carcinogens are chronically toxic substances; that is, they cause damage after repeated or long-duration exposure, and their effects may become evident only after a long latency period.

Reproductive Toxins – Reproductive toxins are substances that have adverse effects on various aspects of reproduction, including fertility, gestation, lactation, and general reproductive performance. When a pregnant woman is exposed to a chemical, the fetus may be exposed as well because the placenta is an extremely poor barrier to chemicals. Reproductive toxins can affect both men and women. Male reproductive toxins can in some cases lead to sterility.

Substances with a High Acute Toxicity – High acute toxicity includes any chemical that falls within any of the following OSHA-defined categories:

- A chemical with a median lethal dose (LD50) of 50 mg or less per kg of body weight when administered orally to certain test populations.
- A chemical with an LD50 of 200 mg less per kg of body weight when administered by continuous contact for 24 hours to certain test populations.
- A chemical with a median lethal concentration (LC50) in air of 200 parts per million (ppm) by volume or less of gas or vapor, or 2 mg per liter or less of mist, fume, or dust, when administered to certain test populations by continuous inhalation for one hour, provided such concentration and/or condition are likely to be encountered by humans when the chemical is used in any reasonably foreseeable manner.

C. Flammable and Combustible Liquids

Flammable and combustible liquids are classified according to their flash point, with flammable liquids having a flash point of less than 100°F and combustible liquids having a flash point between 100-200°F. Both flammable and combustible liquids are considered fire hazards. Flammable/combustible liquids include: alcohols, ketones, xylenes and carboxylic acids. Most organic chemicals are also flammable or combustible.

General rules of handling flammable and combustible liquids include, but are not limited to, the following:

- Keep flammables/combustible materials away from sources of ignition, open flames, hot surfaces, electrical equipment and static electricity.
- Never heat flammable substances with an open flame.
- Store flammable liquids in National Fire Protection Administration (NFPA) approved cabinets or storage rooms designed for flammable materials.
- Keep containers closed and only transfer chemicals in fume hoods.
- Keep no more than 5 gallons (18.9 Liters) of flammables per room outside of flammable liquid storage cabinets at any time.

D. Corrosive Materials

Corrosive chemicals can cause irreversible and visible tissue damage through chemical action at the point of contact. Corrosive chemicals can be liquids, solids, or gases and can affect the skin, eyes, and respiratory tract. Chemicals with a low or high pH are considered corrosive. Therefore, acids and bases are corrosive.

Examples are ammonium hydroxide, hydrochloric acid, nitric acid, phenol, sodium hydroxide and sulfuric acid.

General rules of handling include the following:

- Do not store acids and bases, which are incompatible, together.
- Do not mix an acid and base together and put into a sealed container.
- Protect your eyes with safety goggles when working with corrosives.

- Hand protection and body protection are also necessary and should be chosen based on volumes used and specific corrosive attributes.
- Consult a glove compatibility chart for specific guidance.

E. Highly Reactive and Unstable Materials

Highly reactive or unstable materials are those that have the potential to vigorously polymerize, decompose, condense, or become self-reactive under conditions of shock, pressure, temperature, light, or contact with another material. They can release heat, toxic gas, or flammable gas upon contact with water or air, or moisture in air. Water reactive materials react violently in contact with water.

Examples: lithium, sodium, potassium, organometallic compounds, aluminum bromide, calcium oxide and phosphorus pentachloride. Pyrophoric materials can react with air and ignite spontaneously at or below 113°F (45°C). Pyrophoric materials should be handled and stored in inert environments.

Examples: chlorine trifluoride, phosphine, tert-butyl lithium, silane, white or yellow phosphorous and many finely divided metals.

Safe handling of these materials depends on the specific material and the conditions in which it's handled. The lab should develop specific procedures (SOP) that include hazards, personal protective equipment and engineering controls.

Persons working with these materials should receive training and approval from the Primary Investigator.

F. Compressed Gases and Toxic Gases

A compressed gas is any gas or mixture of gases exerting in a container, a pressure exceeding 40.6 psia (280 kPa, abs) at 68°F (20°C). Generally, the term "compressed gas" also refers to liquefied and dissolved gases meeting these criteria and also include cryogenic gases.

The primary hazards with compressed gas cylinders are the incredible amount of stored energy due to the high pressure, the large volume of gas present, and properties of the gas itself.

All compressed gases are dangerous and must be handled using basic safety rules. A rupture can result in a powerful release of gas that can propel the heavy steel cylinder in a deadly manner.

Toxic gases pose additional potentially acute health hazards to laboratory personnel and the public, and as such, are considered "Restricted Gases" that require prior approval by the Primary Investigator. This also applies to oxidizing and flammable gases.

The following are general rules for the handling and use of compressed gases:

- Compressed gas cylinders must be secured in an upright position away from excessive heat, highly combustible materials and areas where they might be damaged or knocked over.

- A chain, bracket or other restraining device shall be used at all times to prevent cylinders from falling.
- Cylinders of oxygen and other oxidizers must be stored at least 20-feet from fuel-gas or other combustible materials unless separated by a noncombustible wall, not less than 5-feet high, having a fire-resistance rating of ½-hour.
- Cylinders must have valve protection caps on at all times except when containers are secured and connected to dispensing equipment. Empty gas cylinders must also be stored securely with the valve protection cap in place.
- All hazardous materials must be labeled with the name of the chemical and the primary hazard associated with that chemical (flammable, oxidizer, etc.).
- The cylinder status as to “full”, “in-use”, or “empty” must be indicated on the cylinder.
- Flash arrestors should be used to prevent a flash-back, should it occur, in a line containing a flammable gas.
- All tubing and fittings should be checked for integrity when used. If tubing is damaged, cracked or missing, it should be removed from service until properly repaired or replaced.
- Cylinders must be stored in dry, well-ventilated areas. Closets and lockers are not acceptable storage locations.
- Cylinders must not be stored in hallways, corridors, stairwells or near elevators.
- Unobstructed access must be maintained around the cylinders.
- All compressed gases must be recorded in your chemical inventory for the lab.

G. Cryogenic Materials

A cryogenic liquid is defined as a liquid with a normal boiling point below -150 °C (-240 °F). The most common cryogenic liquid used in a laboratory setting is liquid nitrogen. By definition, all cryogenic liquids are extremely cold. Cryogenic liquids and their vapors can rapidly freeze human tissue and can also pose an asphyxiation hazard if handled in confined spaces. The following precautions should be taken when handling cryogenic liquids:

- Use and store cryogenic liquids in well ventilated areas only.
- Wear appropriate PPE while handling cryogenic liquids. Proper PPE for handling cryogenic liquids includes chemical splash goggles, a face shield, cryogenic-safe gloves, long sleeves, long pants, and closed-toe shoes.
- Cryogenic liquids will vent (boil off) from their storage containers as part of normal operation. Containers are typically of a vacuum jacketed design to minimize heat loss. Excessive venting and/or an isolated ice build-up on the vessel walls may indicate a fault in the vessel’s integrity or a problem

in the process line. A leaky container should be removed from service and taken to a safe, well-ventilated area immediately.

- All systems components piping, valves, etc., must be designed to withstand extreme temperatures.
- Pressure relief valves must be in place in systems and piping to prevent pressure build up.

H. Sensitizers

A sensitizer (allergen) is a substance that causes exposed individuals to develop an allergic reaction in normal tissue after repeated exposure to the substance. Examples of sensitizers include diazomethane, chromium, nickel, formaldehyde, isocyanates, arylhydrazines, benzylic and allylic halides, and many phenol derivatives. Sensitizer exposure can lead to all of the symptoms associated with allergic reactions, or can increase an individual's existing allergies.

I. Irritants

Irritants are defined as chemicals that cause reversible inflammatory effects on living tissue by chemical action at the site of contact. A wide variety of organic and inorganic compounds, including many chemicals that are in a powder or crystalline form, are irritants. Symptoms of exposure can include reddening or discomfort of the skin and irritation to respiratory systems.

J. Restricted Chemicals

What constitutes a restricted chemical is left up to the PI who:

- Assesses the use of certain chemicals that can result in conditions of higher risk for laboratory personnel and to facilities.
- Approves the use of Restricted Chemicals when they carry a higher risk due to their inherent hazardous properties.

Typical restricted chemicals:

- Extremely toxic gases
- Reactive metal compounds
- Controlled substances (restricted in terms of licensing requirements)

K. Nanomaterials

Nanomaterials are defined as materials that have at least one external dimension that ranges in size from 1- 100 nanometers. Occupational risks associated with manufacturing and using nanomaterials are not yet clearly defined. Please follow CDC/ NIOSH recommendations for the safe use and production of nanomaterials: http://www.cdc.gov/niosh/topics/nanotech/

L. Select Agent Toxins

Select Agents and Toxins are certain biological agents and toxins which are subject to stringent regulatory requirements under 42 CFR 73, 9 CFR 121, and 7 CFR 331 for their potential to pose a severe threat to public, animals, plant health, or to animal or plant products. These toxins, along with specified biological agents (viruses, bacteria, fungi), fall under the oversight of the Federal Select

Agents Program (FSAP) which requires registration for possession, use, and transfer of the listed Select Agents. UNO does not currently use any select agents. Contact the Associate Vice Chancellor for Research and Creative Activity for additional information.

M. Newly Synthesized Chemicals

Principal Investigators will be responsible for ensuring that newly synthesized chemicals are used exclusively within their laboratories and are properly labeled. If the hazards of a chemical synthesized in the laboratory are unknown, then the chemical must be assumed to be hazardous and the label should indicate the potential hazards of that substance have not been tested and are unknown.

The Principal Investigator must ensure a SDS is prepared for newly synthesized chemicals if:

The chemical is hazardous according to the OSHA definition of hazardous (if the hazards are not known, then the chemical must be assumed to be hazardous).

The newly created chemical or intermediate compound is going to be kept in the lab for an on-going basis for use by current and/or future researchers in the lab where it was originally made.

3. Minimizing Exposures to Hazardous Chemicals

For the general safety of laboratory personnel, all chemical usage must be conducted in adherence with the general safe laboratory practices below. Methods used to specifically control chemical exposures are categorized as follows:

- Engineering Controls
- Administrative Controls
- Personal Protective Equipment

A. Engineering Controls

General lab ventilation cannot be relied upon alone to protect personnel from localized exposures to hazardous levels of airborne chemicals. Engineering controls such as laboratory fume hoods, glove boxes, and other local exhaust systems (e.g. drop-down flexible ducts) may be necessary to provide additional exposure control.

In general, laboratory fume hoods are recommended whenever using hazardous chemicals that:

- Have a high degree of acute toxicity, are carcinogens, or are reproductive toxins, except where there is very low risk of exposure (e.g., use of minimal quantities in a closed system).

- Have a permissible exposure limit of less than 50 ppm (or 0.25 mg/m3 for particulate matter).

- Are appreciably volatile (e.g., solvents) or are easily dispersible in air (e.g., dust).

Additional information can be found in the Fume Hood Manual.

B. Administrative Controls

Administrative controls are one of the steps in the hierarchy of hazard control and they should be used if elimination, substitution and engineering controls cannot effectively minimize the hazard to individuals. Administrative controls include training, procedures, policy, and changes in work schedule to minimize the amount of time an individual may be at risk. Administrative controls include work practices like prohibiting mouth pipetting, recapping needles, lab safety signs warning of hazards present in labs and rotating workers in noisy environments to prevent hearing loss.

Administrative controls for minimizing exposures to hazardous chemicals include, but are not limited to:

- Substituting in less hazardous chemicals (e.g., using proprietary detergents instead of chromic acid for cleaning glassware; or, using toluene instead of benzene for liquid-liquid extraction or chromatography).
- Isolating or enclosing an experiment within a closed system (e.g., glove box, sealed chamber).
- Micro-scaling the size of the experiment to reduce the amount of chemical usage.
- Scale up reactions in small steps and evaluate safety issues after each step to fully understand the reactive properties of the reactants and solvents, which may not have been evident at a smaller scale.

C. Personal Protective Equipment

Information on Personal Protective Equipment (PPE) can be found in the UNO Laboratory Safety Manual. EHS has also developed a Laboratory PPE Selection Guide than can assist laboratory personnel with choosing the appropriate PPE.

4. Standard Operating Procedure

A. Lab Specific Procedures

Standard Operating Procedures (SOP) are sets of written instructions that describe, in detail, how to perform a laboratory process or experiment safely and effectively.

Laboratories are responsible for establishing and maintaining SOPs for all work being conducted in the laboratory that involves the use of hazardous materials (chemical, radioactive, and biological) or physical hazards.

5. Prior Approval and Special Precautions for working with Particularly Hazardous Substances

A. The increased hazard risk associated with Particularly Hazardous Substances (PHS) calls for more strict operating procedures in the laboratory:

Work Habits:

- No eating, drinking, smoking, chewing of gum or tobacco, application of cosmetics or storage of utensils, food or food containers in laboratory areas where PHS are used or stored.
- Wash your hands and arms immediately after the completion of any procedure in which a PHS has been used and when you leave the laboratory.
- Conduct each procedure with the minimum amount of the substance, consistent with the requirements of the work.
- Keep records of the amounts of each highly hazardous material used, the dates of use and the names of the users.
- Fit work surfaces, including fume hoods, with a chemically compatible removable liner of absorbent plastic-backed paper to help contain spilled materials and to simplify subsequent cleanup and disposal.

Personal Protective Equipment:

- PHS may require more stringent use of personal protective equipment. Check the SDS for information on proper gloves, lab clothing and respiratory protection.
- Proper personal protective equipment must be worn at all times when handling PHS.
- Wear lab clothing that protects street clothing, such as a fully fastened lab coat or a disposable jumpsuit, when PHS are being used. Do not wear laboratory clothing used while manipulating PHS outside the laboratory area.
- Wear disposable protective clothing when methods for decontaminating clothing are unknown or not applicable. Discard disposable gloves after each use and immediately after overt contact with a PHS.

Ventilation/Isolation:

- Perform PHS work in a fume hood, glove box, or other form of ventilation. If the chemical may produce vapors, mists or fumes, or if the procedure may cause generation of aerosols, use of a fume hood is required.
- Use a glove box if protection from atmospheric moisture or oxygen is needed or when a fume hood may not provide adequate protection from exposure to the substance; e.g., a protection factor of 10,000 or more is needed.
- Highly toxic gases must be used and stored in a vented gas cabinet connected to a laboratory exhaust system. Gas feed lines operating above atmospheric pressure must use coaxial tubing.

Storage and Transportation:

- Store stock quantities of PHS in a designated storage area or cabinet with limited access. Additional storage precautions (i.e., a refrigerator, a hood, a flammable liquid storage cabinet) may be required for certain compounds based upon other properties.
- Containers must be clearly labeled.
- Consider double containment. Double containment means that the container will be placed inside another container that is capable of holding the contents in the event of a leak and provides a protective outer covering in the event of contamination of the primary container.
- Store containers on trays or pans made of polyethylene or other chemically resistant material.
- Use secondary containment when transporting PHS from one location to another to protect against spills and breakage.

Vacuum Lines and Services:

- Protect each vacuum service, including water aspirators, with an absorbent or liquid trap to prevent entry of any PHS into the system.
- Use a separate vacuum pump when using volatile PHS. Perform the procedure inside a fume hood.

Decontamination and Disposal:

- Decontaminate contaminated materials by procedures that decompose the PHS to produce a safe product or be removed for subsequent disposal.
- Decontaminate all work surfaces at the end of the procedure or work day, whichever is sooner.

B. Laboratory Activity Hazard Assessment Procedure for Particularly Hazardous Substances (PHS)

It is required that complete plans for the handling and ultimate disposal of contaminated wastes and surplus amounts of the PHS prior to the start of any laboratory activity involving a PHS. Laboratories can use the Laboratory Standard for PHS to assist with completing risk assessments.

The PI, Lab Manager, or their designee must complete the PHS Risk Assessment at least once each calendar year. The purpose is to conduct a risk assessment specific to activities in your laboratories. EHS recommends risk assessments are reviewed annually to ensure they are appropriate and training on their use also be conducted annually and prior to any new laboratory personnel prior to work in the affected laboratories. The person conducting the assessment must verify that it is complete and that training has been conducted.

6. Chemical Exposure Assessment

For inhalation hazards an exposure assessment is needed to determine the exposure level of hazardous chemicals. Additional information on chemical hazards can be found on-line in the NIOSH Pocket Guide to Chemical Hazards.

A. Personal Exposure Monitoring

Environmental Health & Safety can provide assistance in conducting a risk assessment to determine if chemical exposure monitoring is necessary in the laboratory. For more information on exposure monitoring in the laboratory, please contact Environmental Health and Safety at (402) 554-3596.

7. Chemical Labeling, Storage and Inventory

A. Labeling

To meet the EPA regulations of chemical labeling, templates are available for laboratories to print and use within their laboratories on the EHS website: Chemical Labeling. All chemical products and chemical waste containers must be labeled appropriately.

Additional information on labeling requirements can be found in the Chemical Disposal and Chemical Collection Containers and Storage fact sheets.

If you have any questions regarding chemical labels, please contact EHS at (402) 554-3596.

B. Storage

Due to the diverse individual properties of chemicals that may be located in a chemical use area, proper storage requirements may be complicated. Some general procedures for chemical storage are listed in the Chemical Storage Fact Sheet.

These procedures are not intended to be all-inclusive, but should form the basis for more specific procedures in the workplace. Specific instructions on chemical storage may be obtained from the Safety Data Sheet, container label, or by contacting the EHS Office.

C. Chemical Inventory

In order to respond safely to laboratory emergencies, the Omaha Fire/HAZMAT Department has requested chemical inventories, to include chemical name, CAS number, location and quantity, for each laboratory room at UNMC/Nebraska Medicine. Additional information can be found on the EHS Website, Chemical Inventories.

8. Hazardous Waste Management

A. Introduction

EHS - Chemical Safety is responsible for the “cradle to grave” management of chemicals, in accordance with Occupational Health and Safety Administration (OSHA) and Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) regulatory requirements. Chemical Safety is also responsible for managing the ground and air shipping of hazardous materials/dangerous goods, in accordance with the Department of Transportation (DOT) and the International Air Transport Association (IATA) regulatory requirements.

B. Environmental Protection Agency

The primary mission of the Environmental Protection Agency (EPA) is to protect and enhance our environment. EPA is the lead agency responsible for carrying out SARA Title III reporting requirements. Under Superfund and other related laws, it is the agency primarily responsible for hazardous waste site operations and Superfund site cleanup activities. EPA also conducts technical and environmental training programs related to hazardous materials. At the request of community officials, EPA can provide technical expertise on the full range of environmental contamination issues.

The Resource Conservation and Recovery Act of 1976 (RCRA)

This law, administered by EPA, establishes a Federal program to provide comprehensive regulation of hazardous waste. This includes certain materials that pose a potential threat to public health and safety when they are discarded. RCRA regulations provide and maintain a hazardous waste management system that covers the generation, transportation, use, and disposal of such waste (sometimes summarized as regulation from "cradle to grave"). Major control mechanisms include a manifest system to track hazardous waste shipments and a permit system requiring waste site owners and operators to comply with specified safety standards. While RCRA primarily regulates safety precautions at hazardous waste facilities in operation today, it also has strong provisions potentially relevant to cleanup if any part of a facility was in operation during the 1980s.

The Clean Air Act (CAA)

This act, passed in 1970, is the basic Federal law for controlling air pollution. It requires EPA to keep an up to date list of industrial pollutants that are hazardous to human health, and set an emission standard for each "with an ample margin of safety." Under the law, EPA prepares minimum pollution standards, and States prepare implementation plans showing how these standards will be attained. States issue permits for the release of listed pollutants into the atmosphere, and take samples to evaluate the State's air quality.

The Clean Water Act (CWA)

Originally enacted in 1972, this act envisioned swimmable waters by 1983 and pollution discharges halted by 1985. Obviously, these goals were not accomplished. The law continues to promote clean water by supporting construction of sewage treatment facilities (which are currently bearing a heavy burden in processing pollutants); supporting the preparation of water quality plans encompassing the entire Nation; and setting up a permit system restricting the amount and type of pollutants that can be discharged into the Nation's waterways. The law is primarily designed to address point sources of pollution, although nonpoint sources such as agricultural runoff is starting to be addressed.

The Safe Drinking Water Act (SDWA)

This act is specifically designed to protect public water supplies from contamination by mandating water testing, denying Federal funds to projects that threaten critical water supplies, and requiring States to submit plans to protect public wells from contamination.

Pesticides Legislation

Both the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and the Federal Food, Drug and Cosmetic Act (FFDCA) regulate pesticides. Originally requiring mere registration of pesticides, FIFRA was amended in 1972 to require testing for short term and long term toxic effects prior to registration. For pesticides used on food crops, EPA establishes an upper limit on the amount of residue that can remain on food based on human tolerance levels. The FFDCA requires the Food and Drug Administration (FDA) to enforce these residue limits by monitoring and seizing foods whose residues are in excess of these standards.

The Toxic Substances Control Act (TSCA)

This legislation was passed in 1976 to reduce the threat from new chemicals that "present or will present an unreasonable risk of injury to health or the environment." As a result, chemical producers are required to research the effects of new chemicals and notify EPA before they are manufactured. EPA has the authority to ban or restrict chemical uses if there is sufficient evidence that the substance poses an "unreasonable risk." The Act also regulates polychlorinated biphenyls (PCBs) and asbestos.

Comprehensive Emergency Response, Compensation and Liability Act (CERCLA)

In 1980, Congress passed the Comprehensive Emergency Response, Compensation and Liability Act or CERCLA. This is commonly known as Superfund. The bill's purpose was to fund cleanups and emergency response actions for some of the worst inactive or abandoned hazardous waste sites scattered across the country. A billion dollar revolving trust fund--financed primarily by a tax on certain chemical and petroleum products--was created to pay for Federal and State response actions when releases of hazardous substances pose an existing or potential threat to human health or the environment.

In 1986, this bill was revised and expanded in the Superfund Amendments and Reauthorization Act of 1986 (SARA). The third part of SARA, Title III, is known as the Emergency Planning and Community Right to Know Act of 1986. This portion of the legislation makes over three hundred "extremely hazardous substances" subject to routine and detailed reporting to designated local, State, and Federal government agencies. It also requires local planning committees to use this information (and other data on local hazards) to create effective plans for hazardous materials emergencies.

C. The Department of Transportation

The Department of Transportation (DOT) establishes the Nation's overall transportation policy. It bears the primary responsibility for issuing standards and regulations relating to the transportation of hazardous materials from State to State nationwide. (Hazardous materials which are transported only within a State's borders are regulated by State law.) DOT is heavily involved in identifying safer modes of hazardous materials transport, and has significant regulatory, research and development, and training functions in this area. DOT trains and

inspects carriers and shippers of hazardous materials to ensure that they are in full compliance with regulatory guidelines.

Hazardous Materials Transportation Act of 1974 (HMTA)
The purpose of this Act is to improve the regulation and authority of the Secretary of Transportation to protect the nation adequately against risk to life and property which are inherent in the transportation of hazardous materials in commerce.

The Department of Transportation (DOT) was responsible for issuing the HMTA regulations (49 CFR 171-177). These regulations govern the packaging, marking, labeling, and acceptable condition of hazardous materials offered for intrastate or interstate transportation. It also covers the actual transportation procedures and specifications for motor vehicle, aircraft, rail car, and vessels carrying hazardous materials. HMTA as amended by the Hazardous Materials Transportation Uniform Safety Act of 1990 (HMTUSA).

Some key provisions are:

- Shipping Papers:
  The person offering a hazardous material for transportation must provide a shipping paper with required information, and in the event of an emergency incident, immediately disclose the information to appropriate emergency response authorities.

- Training Requirements:
  Regulations have been issued specifying the requirements for training of "HazMat employees" (individuals who affect transportation of hazardous materials including employees who handle, prepare or package hazardous materials or operate a vehicle to transport hazardous materials).

These requirements are in addition to the Hazardous Waste Operations and Emergency Response (HAZWOPER) training requirements under OSHA and EPA.

- Identify and safeguard:
  Improvement of the placarding system and development of a central reporting system and computerized telecommunications data center.

The Federal Aviation Administration
The Federal Aviation Administration (FAA) is a department of the DOT and is responsible for enforcing Air Transportation and the Dangerous Goods Regulations of the United States.

The International Air Transport Association
The International Air Transport Association (IATA) is made up of airlines from around the world. The member airlines of IATA recognize the need to transport by air, articles and substances having properties which, if uncontrolled, could adversely affect the safety of the passengers, crew and/or aircraft on which they are carried. In response to this concern IATA developed The Dangerous Goods Regulations based on The International Civil Aviation Organization (ICAO)

Technical Instructions. The regulations list the types of materials suitable for air transport and provide packaging, labeling and documentation instructions for them. They also spell out the training requirement for people involved with handling of dangerous goods and the notifications required in the event of a spill.

Hazardous Materials/Dangerous Goods Shipping at UNO is overseen and training conducted by UNMC EHS. For information on transporting chemicals, please see the Hazardous Materials/Dangerous Goods Shipping Plan.

D. Hazardous Material Fact Sheets

The variety of chemicals generated at UNO prohibits the development of guidelines specific to each chemical. However, guidelines for the disposal of some chemical wastes are presented and must be subsequently tailored to accommodate different types of chemicals.

Environmental Health and Safety has developed Hazardous Material Fact Sheets for certain chemical/chemical products. Please use these as a quick reference to guide you as you generate and dispose of these items.

Some common chemical waste streams, including compressed gas containers, water reactive compounds, shock-sensitive compounds, pyrophoric chemicals, peroxide-forming chemicals, biohazardous/infectious waste, chemotherapy, mixed (radioactive and hazardous) waste, dioxin, battery collection, commercial (trade name) products, spent photo fixer, spent Cidex (glutaraldehyde), formalin and unknown chemicals, are addressed in this section for easy reference.

If questions arise concerning the appropriate disposal procedures for these chemicals or chemicals not listed in this section, contact EHS at 402.554.3596.

E. Accumulation Limits

Any full containers of used chemicals or excess beyond the maximum volume of 30 gallons must be tagged for disposal by EHS. Please see Chemical Disposal Factsheet.

9. Chemical Hazard Information

A. Hazard Identification

- Physical. Noise, vibration, lighting, electrical, heat and cold, nuisance dust, fire/explosion, machine grinding, working space.
- Ergonomic
- Chemical
- Radiation
- Psychological
- Biological

Effective controls protect workers from workplace hazards; help avoid injuries, illnesses, and incidents; minimize or eliminate safety and health risks; and help employers provide workers with safe and healthful working conditions. The processes described in this section will help employers prevent and control hazards identified in the previous section.

To effectively control and prevent hazards, employers should:

- Involve workers, who often have the best understanding of the conditions that create hazards and insights into how they can be controlled.
- Identify and evaluate options for controlling hazards, using a "hierarchy of controls."
- Use a hazard control plan to guide the selection and implementation of controls, and implement controls according to the plan.
- Develop plans with measures to protect workers during emergencies and non-routine activities.
- Evaluate the effectiveness of existing controls to determine whether they continue to provide protection, or whether different controls may be more effective. Review new technologies for their potential to be more protective, more reliable, or less costly.

Please see the Laboratory Safety Manual section 3.0 Hazard Assessments in Research Laboratory for more information.

10. Emergency Response- Spills and Exposures

Information on Emergency Spill Procedures can be found on-line:
UNO Chemical Safety Emergency Guide

A. Laboratory Safety Signs

In order to provide information to emergency response personnel about hazards present in laboratories, each laboratory on campus should have a current lab sign posted at the corridor door leading into the laboratory room/space.

Download the April 2020 Laboratory Sign.

B. Chemical Spills

The goal is to minimize the potential for spills and to prepare for chemical spills. Chemical spill kits should be available in laboratory areas where chemicals are used. Please review the UNO Chemical Spill Plan. Chemical Spill procedures can be found in the UNO Chemical Safety Emergency Guide.

C. Chemical Exposures

Contact Public Safety at (402) 554-2911.

D. Incident Reporting

Download the Incident Report Form

11. Medical Consultation, Examination and Surveillance

The purpose of the medical surveillance program is to evaluate the health of employees related to their potential occupational exposures to hazardous agents. This program will also assure compliance with various regulations which require medical monitoring when employees use certain materials, are exposed to certain biological or physical hazards or are members of certain regulated occupational groups. The Medical Surveillance Policy does not include ergonomic-related illnesses and work-related injuries/illnesses (worker's compensation claims) covered under the University Workers Compensation Program. Those working with animals should refer to the Coordinator of Animal Care at 402.554.2943.