UNIVERSITY OF NEBRASKA AT OMAHA
ENVIRONMENTAL HEALTH & SAFETY

LABORATORY SAFETY MANUAL

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On-Campus Emergency Telephone Numbers

To make an on-campus phone call from a campus phone, dial 4 followed by the four-digit extension.

To make an off-campus call from a campus phone, dial 9 followed by the 10-digit phone number.

Biohazardous Spill	Ext. 4-2911
Building Utilities, Repair & Maintenance (Facilities Service Desk)	Ext. 4-3600
Cardiac Arrests	Call 911 then Ext. 4-2911
Chemical Spills	Ext. 4-2911
Emergencies	Ext. 4-2911 ("911" if life-threatening)
Environmental Services	Ext. 4-2500
Fire	Ext. 4-2911 ("911" if off campus)
Fume Hood/ Biological Safety Cabinet Issues	Ext. 4-3600
Gas Odors/Leaks	4-2911 then 402.554.7777 (MUD)
Health Services (Nebraska Medicine)	Ext. 4-2374
Information Security Incidents	Ext. 4-2492 or security@unomaha.edu
Laboratory Sign Updates/Changes	Ext. 4-3921
Medical Emergencies	Ext. 4-2911 ("911" if off campus)
Needle Sticks/Body Fluid Exposures	Ext. 4-2374
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Poison Control Center	402.955.5555 or 1.800.222.1222
Radiation Safety Office	Ext. 4-3921
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Safety Officer	Ext. 4-2239
Public Safety Dispatch (non-emergency)	Ext. 4-2648
Threats or Workplace Violence	Ext. 4-2911

Mission

As both a Metropolitan University of distinction and a Carnegie Doctoral Research institution, the University of Nebraska at Omaha (UNO) transforms and improves the quality of life locally, nationally, and globally.

Vision

The University of Nebraska at Omaha is recognized as the premier Metropolitan University throughout the United States and the world.

Values

1. ***Excellence***: focusing on exceptional education, groundbreaking research, and the life-long success of our students and alumni.

2. ***Engagement***: strengthening our community through the transformative power of shared resources, dynamic collaboration, and sustained partnerships.

3. ***Inclusion***: creating an environment that is welcoming, open, and diverse; committing to the accessibility of our campus and academic programs; and ensuring a respectful and safe campus environment.

4. ***Discovery***: fostering a culture of critical thinking and creativity, and upholding the rigorous pursuit and exchange of knowledge.

5. ***Integrity*****:** embodying the highest of professional and ethical standards.

6. ***Maverick Spirit***: exemplifying strength, resilience, curiosity, independent thinking, and entrepreneurism in our everyday deeds and collective endeavors.

Introduction

The University of Nebraska Medical Center Environmental Health and Safety department developed this manual to assist in the recognition, evaluation, and control of chemical and physical hazards associated with University laboratory operations. UNO Environmental Health and Safety has adapted this manual for a similar purpose on this campus. This manual is intended to establish the basic safe operating practices so that investigators, lab technicians, and students may carry out effective teaching and research in a safe environment. This manual is not intended to be a complete listing of laboratory hazards or safe practices.

The majority of the contents of this manual will be inclusive for all UNO laboratories. With the diverse nature of work being conducted in UNO laboratories, additional procedures or requirements may be necessary to meet safety regulations.

If there are any questions regarding the contents of the laboratory safety manual, please contact Environmental Health and Safety at 402.554.3596.

For additional information, please check the resources below.

Environmental Health and Safety: ehs.unomaha.edu

Biosafety: unmc.edu/ibc/about/index.html

IACUC: unomaha.edu/office-of-research-and-creative-activity/compliance-and-policies/institutional-animal-care-and-use-committee .php

UNMC IRB: unmc.edu/irb/

1.0 Assignment of Responsibility

It is the responsibility of all staff, student workers and faculty of UNO to read, understand and comply with UNO 's safety policies, safe work practices, procedures and guidelines. Everyone is responsible to take precaution to protect the safety of other workers and himself/herself.

1.1 The Principal Investigator (PI)

The PI has the ultimate responsibility for controlling hazards in her/his laboratory.

This shall include:

1. Completing a hazard assessment for all procedures and experiments
2. Instructing laboratory personnel on potential hazards
3. Correcting work errors and dangerous conditions
4. Encouraging a positive attitude towards safety
5. Selecting the proper personal protective equipment (PPE) and ensuring that it is worn
6. Maintaining all relevant compliance records
7. Investigating the circumstances surrounding a laboratory incident and taking steps to avoid reoccurrence

1.2 Sponsored Programs and Research

Sponsored Programs and Research is responsible for supporting the PI and directing research staff to all human and training resources necessary to ensure safety compliance.

1.3 Individual laboratory workers

Individual laboratory workers are responsible for their own safety and the safety of their coworkers and visitors to their laboratories. It is each laboratory worker's responsibility to wear the personal protective equipment (PPE) assigned to them, adhere to prescribed safety rules and regulations, and to know and follow all emergency procedures. Lab staff must complete all necessary training and maintain certification of Lab, chemical, and radiation safety training.

1.4 The University of Nebraska at Omaha (UNO)

UNO will provide assistance for the compliance efforts of all staff and researchers. It will foster an attitude that safety is of the utmost importance.

1.5 UNO Environmental Health & Safety (EHS)

UNO EHS will ensure that recognized health and safety standards and legal requirements are met through the provision of policies, procedures, guidelines, mandatory training, and conduct internal safety audits.

2.0 Emergency Procedures

Employees and students should know escape routes and be able to locate the emergency exits from the area in which they work. Never use an elevator as part of your escape route. Learn where the fire alarm pull stations and fire extinguishers are in your work area. By knowing the location of these items, you can help expedite response time which assists in minimizing the risk of injury and/or death.

Individuals should report all emergencies to Public Safety by calling 402.554.2911.

2.1 Emergency Preparedness Flipcharts

UNO has established an emergency preparedness procedures flipchart that is designed to guide individuals during emergencies such as fire, disaster, bomb threats and/or medical emergencies. Emergency preparedness procedure flipcharts are located in various locations across the campus. Designated locations include, but are not limited to, the elevator corridors and stair tower exits.

An abbreviated listing of emergency procedures can be found online at:
unomaha.edu/emergency/

3.0 Hazard Assessments in Research Laboratories

All principal investigators (PI), laboratory supervisors or managers have the responsibility for controlling hazards in his/her laboratory. A survey must be conducted of the work areas and activities under their control to determine what hazards exist, steps to take to minimize those hazards, and what personal protective equipment (PPE) may be required.

Prior to performing any assigned job duties, laboratory personnel should be aware of the hazards present in the laboratory and the steps necessary to minimize or eliminate them. Employees and students should know what personal protective and safety equipment is available, when it is required, how to use it, when it is not safe to use and how to dispose of items properly.

All laboratory personnel have the responsibility to strive for a safe working environment.

3.1 Laboratory Work Risk Assessment

Applying the risk management approach to safety in the laboratory means completing a risk assessment for all research projects or experiments prior to beginning the work. The research worker should discuss the assessment with the lab manager or his/her Principal Investigator. Risk assessments should identify potential hazards and determine what actions are required to eliminate or minimize any risks to the health of workers.

Carrying out a risk assessment for an experiment requires three simple steps:

1. IDENTIFY the hazards associated with the substances and tasks.
2. ASSESS the risk of exposure to the hazard.
3. CONTROL the risk by implementation of procedures and precautions.

Prior to starting an experiment, gather all the necessary information about the experiment, the design of the experiment, and most importantly the Safety Data Sheets (SDS) for ALL hazardous substances involved with the experiment.

3.2 Globally Harmonized System (GHS)

The United States is currently participating in the Global Harmonization System (GHS) of Hazard Communication. The GHS process is designed to improve comprehensibility, and thus the effectiveness of hazard communication, and help to further reduce illnesses and injuries. GHS is a system that defines and classifies the hazard of chemical products, and communicates health and safety information on labels and safety data sheets. The biggest visible impact of the GHS is the appearance of, and information required for labels and SDSs

Labels will require signal words, pictograms, precautionary statements and appropriate hazard statements. The goal is that the same set of rules for classifying hazards, and the same format and contents for labels and safety data sheets will be adopted and used around the world.

3.3 National Fire Protection Association (NFPA)

The National Fire Protection Association (NFPA) has devised a voluntary marking system to alert firefighters to the characteristics of hazardous materials stored in stationary tanks and facilities. This system, known as NFPA 704 M, assists in readily identifying the hazard presented by the stored substance.

3.3a Understanding the NFPA Diamond

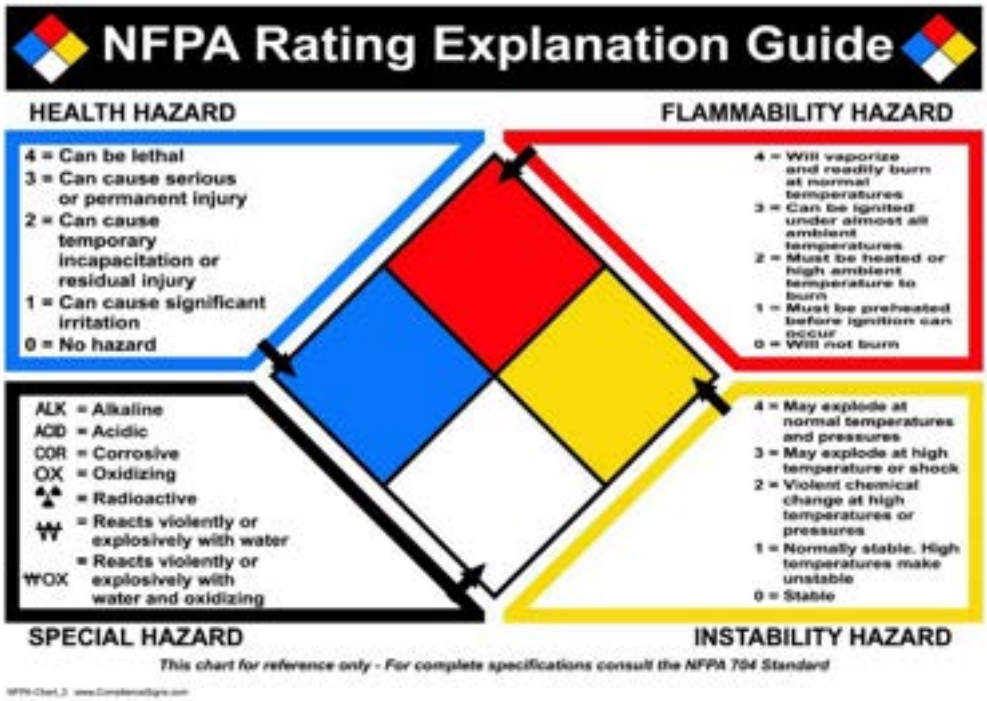
- The NFPA 704 M labels are diamond-shaped, and is divided into four parts, or quadrants.

- The left quadrant is blue and contains the substance's health hazard rating. It includes a numerical rating of 4 indicating a danger level so severe that a very short exposure could cause serious injury or death. A zero, or no code at all in this quadrant, means that no unusual hazard would result from exposure.

- The top quadrant is red and contains the substance's fire hazard rating. Again, numerical ratings in this quadrant range from 0 to 4, with 4 representing the most serious hazard.

- The right quadrant is yellow and contains the substance's likelihood to explode or react. As with the health and fire hazard quadrants, numerical ratings from 0 to 4 are used to indicate the degree of danger. If a 4 appears in this quadrant, the chemical is extremely unstable and even under normal conditions may explode or react violently. A zero in this quadrant indicates that the material is considered to be stable, even in the event of a fire.

- The bottom quadrant is white and contains information about any specific hazards that may apply. The photo below indicates the alphabetic codes that are used within this quadrant to specify additional hazard conditions.



3.4 Safety Data Sheets (SDS)

Hazardous materials are common in the modern workplace, and it is clearly important that workers know when they are handling these materials to ensure adequate protection and compliance with the proper safety procedures. Fortunately, the Hazard Communication Standard, created by OSHA, requires employers who use hazardous materials must make Safety Data Sheets (formerly known as Material Safety Data Sheets) available for employee use and reference, and provide appropriate warning labels on containers of hazardous substances within the facility.

Hazardous materials present physical and/or health threats to workers in clinical, industrial, and academic laboratories. Each laboratory must identify which hazardous materials will be encountered by its workers. ***All containers for chemicals must be clearly labeled.*** The Principal Investigator and/or attending lab supervisor/manager must ensure that workers do not use, store or allow any other person to use or store, any hazardous substance in his or her laboratory if the container does not meet the labeling requirements.

Safety Data Sheets (SDS) for chemicals received by the laboratory must be supplied by the manufacturer and must be maintained and readily accessible to laboratory workers. SDSs are written or printed materials concerning a hazardous material. Laboratories must have an SDS on file for each hazardous chemical in use or being stored in the laboratory. The SDS should be used to orient laboratory workers on the potential hazards associated with these items and what personal protective equipment should be used.

3.4a Sample of Safety Data Sheet

To view an entire sample of a safety data sheet, please see the following link: [Sigma-Aldrich Acetonitrile SDS]

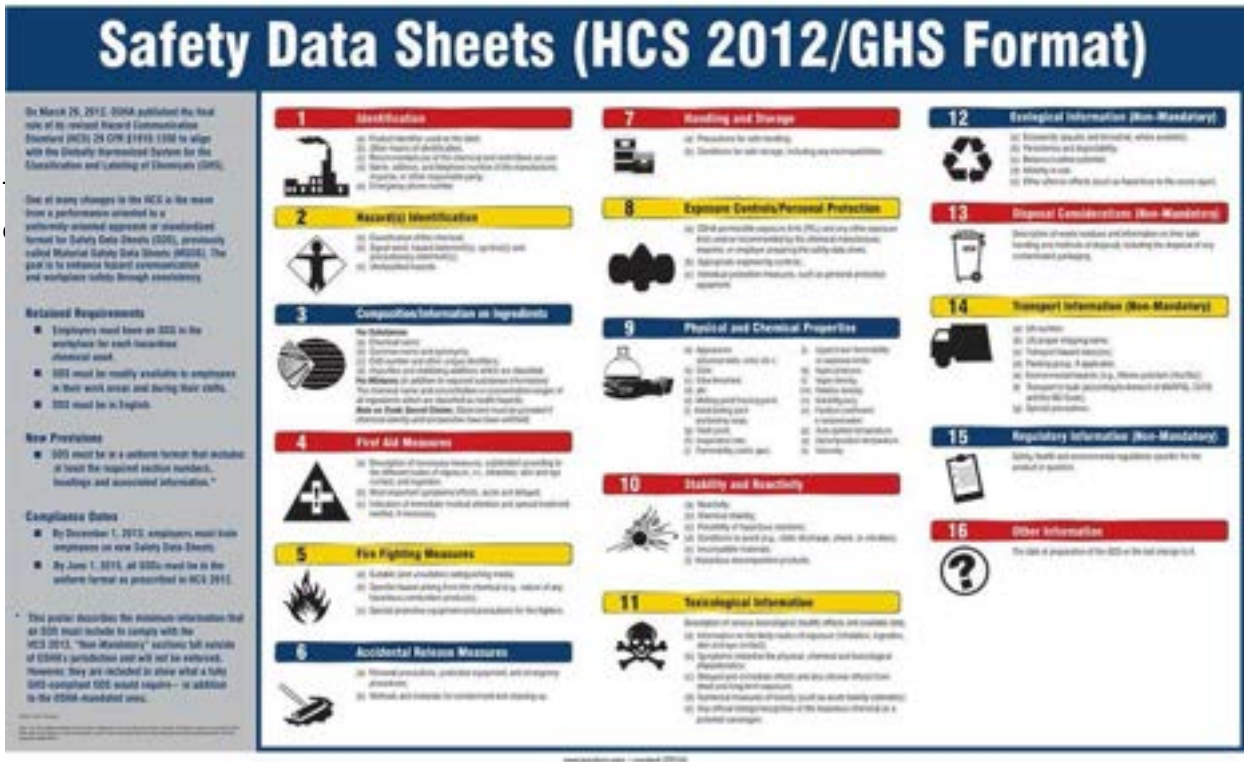
SIGMA-ALDRICH

SAFETY DATA SHEET

Acetonitrile

3.5 How to Read: Safety Data Sheets

The information listed below is a publication by OSHA and can be found online at: osha.gov/Publications/OSHA3514.html



The information contained in the SDS is largely the same as the MSDS, except now the SDSs are required to be presented in a consistent user-friendly, 16-section format. This brief provides guidance to help workers who handle hazardous chemicals to become familiar with the format and understand the contents of the SDSs.

The SDS includes information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical. The information contained in the SDS must be in English (although it may be in other languages as well). In addition, OSHA requires that SDS preparers provide specific minimum information as detailed in Appendix D of 29 CFR 1910.1200. The SDS preparers may also include additional information in various section(s).

Sections 1 through 8 contain general information about the chemical, identification, hazards, composition, safe handling practices, and emergency control measures (e.g., firefighting). This information should be helpful to those that need to get the information quickly. Sections 9 through 11 and 16 contain other technical and scientific information, such as physical and chemical properties, stability and reactivity information, toxicological information, exposure control information, and other information including the date of preparation or last revision. The SDS must also state that no applicable information was found when the preparer does not find relevant information for any required element.

The SDS must also contain Sections 12 through 15, to be consistent with the UN Globally

Harmonized System of Classification and Labeling of Chemicals (GHS), but OSHA will not enforce the content of these sections because they concern matters handled by other agencies.

A description of all 16 sections of the SDS, along with their contents, is presented below:

Section 1: Identification

This section identifies the chemical on the SDS as well as the recommended uses. It also provides the essential contact information of the supplier. The required information consists of:

- Product identifier used on the label and any other common names or synonyms by which the substance is known.
- Name, address, phone number of the manufacturer, importer, or other responsible party, and emergency phone number.
- Recommended use of the chemical (e.g. a brief description of what it actually does, such as flame retardant) and any restrictions on use (including recommendations given by the supplier).

Section 2: Hazard(s) Identification

This section identifies the hazards of the chemical presented on the SDS and the appropriate warning information associated with those hazards. The required information consists of:

- The hazard classification of the chemical (e.g. flammable liquid, category).
- Signal word.
- Hazard statement(s)
- Pictograms (the pictograms or hazard symbols may be presented as graphical reproduction of the symbols in black and white or be a description of the name of the symbol (e.g. skull and cross bones, flame).
- Description of any hazard not otherwise classified.
- For a mixture that contains an ingredient(s) with unknown toxicity, a statement describing how much (percentage) of the mixture consists of ingredient(s) with unknown acute toxicity. Please note that this is a total percentage of the mixture and not tied to the individual ingredient(s).

Section 3: Composition/Information on Ingredients

This section identifies the ingredient(s) contained in the product indicated on the SDS, including impurities and stabilizing additives. This section includes information on substances, mixtures, and all chemicals where a trade secret is claimed. The required information consists of:

Substances

- Chemical name.
- Common name and synonyms.
- Chemical Abstracts Service number and other unique identifiers.
- Impurities and stabilizing additives, which are themselves classified and which contribute to the classification of the chemical.

Mixtures

- Same information required for substances.
- The chemical name and concentration (i.e., exact percentage) of all ingredients which are classified as health hazards and are
    - Present above their cut-off/concentration limits or
    - Present a health risk below the cut-off/concentration limits.
- The concentration (exact percentages) of each ingredient must be specified except concentration ranges may be used in the following situations:
    - A trade secrete claim is made,
    - There is batch-to-batch variation, or
    - The SDS is used for a group of substantially similar mixtures.

Chemical where a trade secret is claimed

- A statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

Section 4: First-Aid Measures

This section describes the initial care that should be given by untrained responders to an individual who has been exposed to the chemical. The required information consists of:

- Necessary first-aid instructions by relevant routes of exposure (inhalation, skin and eye contact, and ingestion.
- Description of the most important symptoms or effects, and any symptoms that are acute or delayed.
- Recommendations for immediate medical care and special treatment needed, when necessary.

Section 5: Fire-fighting Measures

This section provides recommendations for fight a fire caused by the chemical. The required information consists of:

- Recommendations of suitable extinguishing equipment, and information about extinguishing equipment that is not appropriate for a particular situation.
- Advice on specific hazards that develop from the chemical during the fire, such as any hazardous combustion products created when the chemical burns.
- Recommendations on special protective equipment or precautions for firefighters.

Section 6: Accidental Release Measures

This section provides recommendations on the appropriate response to spills, leaks, or releases, including containment and cleanup practices to prevent or minimize exposure to people, properties, or the environment. It may also include recommendations distinguishing between responses for large and small spills where the spill volume has a significant impact on the hazard. The required information may consist of recommendations for:

- Use of personal precautions (such as removal of ignition sources or providing sufficient ventilation) and protective equipment to prevent the contamination of skin, eyes, and clothing.
- Emergency procedures, including instructions for evacuations, consulting experts when needed, and appropriate protective clothing.
- Methods and materials used for containment (e.g., covering the drains and capping procedures).
- Cleanup procedures (e.g., appropriate techniques for neutralization, decontamination, cleaning or vacuuming; adsorbent materials; and/or equipment required for containment/clean up)

Section 7: Handling and Storage

This section provides guidance on the safe handling practices and conditions for safe storage of chemicals. The required information consists of:

- Precautions for safe handling, including recommendations for handling incompatible chemicals, minimizing the release of the chemical into the environment, and providing advice on general hygiene practices (e.g., eating, drinking, and smoking in work areas is prohibited).
- Recommendations on the conditions for safe storage, including any incompatibilities. Provide advice on specific storage requirements (e.g., ventilation requirements)

Section 8: Exposure Controls/Person Protection

This section indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure. The required information consists of:

- OSHA Permissible Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.
- Appropriate engineering controls (e.g., use local exhaust ventilation, or use only in an enclosed system).
- Recommendations for personal protective measures to prevent illness or injury from exposure to chemicals, such as personal protective equipment (PPE) (e.g., appropriate types of eye, face, skin or respiratory protection needed based on hazards and potential exposure).
- Any special requirements for PPE, protective clothing or respirators (e.g., type of glove material, such as PVC or nitrile rubber gloves; and breakthrough time of the glove material).

Section 9: Physical and Chemical Properties

This section identifies physical and chemical properties associated with the substance or mixture. The minimum required information consists of:

- Appearance (physical state, colors, etc.);
- Upper/lower flammability or explosive limits;
- Odor;
- Vapor pressure;
- Odor threshold;
- Vapor density;
- pH;
- Relative density;
- Melting point/freezing point;
- Solubility(ies);
- Initial boiling point and boiling range;
- Flash point;
- Evaporation rate;
- Flammability (solid, gas);
- Partition coefficient: n-octanol/water;
- Auto-ignition temperature;
- Decomposition temperature; and
- Viscosity.

Section 10: Stability and Reactivity
This section describes the reactivity hazards of the chemical and the chemical stability information. This section is broken into three parts: reactivity, chemical stability, and other. The required information consists of:

Reactivity

- Description of the specific test data for the chemical(s). This data can be for a class or family of the chemical if such data adequately represent the anticipated hazard of the chemical(s), where available.

Chemical Stability

- Indication of whether the chemical is stable or unstable under normal ambient temperature and conditions while in storage and being handled.
- Description of any stabilizers that may be needed to maintain chemical stability.
- Indication of any safety issues that may arise should the product change in physical appearance.

Other

- Indication of the possibility of hazardous reactions, including a statement whether the chemical will react or polymerize, which could release excess pressure or heat, or create other hazardous conditions. Also, a description of the conditions under which hazardous reactions may occur.
- List of all conditions that should be avoided (e.g., static discharge, shock, vibrations, or environmental conditions that may lead to hazardous conditions).
- List of all classes of incompatible materials (e.g., classes of chemicals or specific substances) with which the chemical could react to produce a hazardous situation.
- List of any known or anticipated hazardous decomposition products that could be produced because of use, storage, or heating. (Hazardous combustion products should also be included in Section 5 (Fire-Fighting Measures) of the SDS.)

Section 11: Toxicological Information

This section identifies toxicological and health effects information or indicates that such data are not available. The required information consists of:

- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact). The SDS should indicate if the information is unknown.
- Description of the delayed, immediate, or chronic effects from short- and long-term exposure.
- The numerical measures of toxicity (e.g., acute toxicity estimates such as the LD50 (median lethal dose)) - the estimated amount [of a substance] expected to kill 50% of test animals in a single dose.
- Description of the symptoms. This description includes the symptoms associated with exposure to the chemical including symptoms from the lowest to the most severe exposure.
- Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA

Section 12: Ecological Information *(non-mandatory)*

This section identifies toxicological and health effects information or indicates that such data are not available. The required information consists of:

- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact). The SDS should indicate if the information is unknown.
- Description of the delayed, immediate, or chronic effects from short- and long-term exposure.
- The numerical measures of toxicity (e.g., acute toxicity estimates such as the LD50 (median lethal dose)) - the estimated amount [of a substance] expected to kill 50% of test animals in a single dose.
- Description of the symptoms. This description includes the symptoms associated with exposure to the chemical including symptoms from the lowest to the most severe exposure.
- Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA.

Section 13: Disposal Considerations *(non-mandatory)*

This section provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container, and safe handling practices. To minimize exposure, this section should also refer the reader to Section 8 (Exposure Controls/Personal Protection) of the SDS. The information may include:

- Description of appropriate disposal containers to use.
- Recommendations of appropriate disposal methods to employ.
- Description of the physical and chemical properties that may affect disposal activities.
- Language discouraging sewage disposal.
- Any special precautions for landfills or incineration activities.

Section 14: Transport Information *(non-mandatory)*

This section provides guidance on classification information for shipping and transporting hazardous chemical(s) by road, air, rail, or sea. The information may include:

- UN number (i.e., four-figure identification number of the substance).
- UN proper shipping name.
- Transport hazard class(es).
- Packing group number, if applicable, based on the degree of hazard.
- Environmental hazards (e.g., identify if it is a marine pollutant according to the International Maritime Dangers Goods Code (IMDG Code)).
- Guidance on transport in bulk (according to Annex II of MARPOL 73/78[3] and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code (IBC Code)).
- Any special precautions which an employee should be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises (indicate when information is not available).

Section 15: Regulatory Information *(non-mandatory)*

This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS. The information may include:

- Any national and/or regional regulatory information of the chemical or mixtures (including any OSHA, Department of Transportation, Environmental Protection Agency, or Consumer Product Safety Commission regulations).

Section 16: Other Information

This section indicates when the SDS was prepared or when the last known revision was made. The SDS may also state where the changes have been made to the previous version. You may wish to contact the supplier for an explanation of the changes. Other useful information also may be included here.

3.6 SDS On-line Access

Each user of chemicals on campus must demonstrate proficiency at producing SDSs, either by maintaining hard copies or by demonstrating the ability to access appropriate SDSs in a timely (emergency) fashion and to be able to print same. The links below are commonly used and are made available free of charge to the University.

Sigma-Aldrich Searchable by name or product number
Fisher Scientific Searchable by name or product number
Vermont SIRI - Includes several manufacturers, MSDS's and links to others.

If you are unable to find an appropriate SDS, please contact EHS by calling 402.554.3596 or by email at unoehs@unomaha.edu.

3.7 Exposure Monitoring

If you are using any of the chemicals listed below, Environmental Health and Safety can provide assistance in conducting a risk assessment to determine if exposure monitoring is necessary in the laboratory. For more information, please contact EHS at 402.554.3596.

1,2-dibromo-3-chloroporpane
1,3-Butadiene
2-Acetylaminofluroene
3-Dichlorobenzidine and salts
3'3-Dichlorobenzidine and salts
4-Aminodiphenyl
4-Dimethylaminoazobenzene
4-Nitrobiphenyl
Acetic Acid
Acrylonitrile
Alpha-Naphthylamine
Benzene
Benzidine
beta-Naphthylamine
beta-Propiolactone
bis-Chloromethyl ether
BTEX + Saturated Hydrocarbons
Cadmium
Chromium VI
Collodion
Dichloromethane
Ethyl Alcohol
Ethylene oxide
Ethyleneimine
Formaldehyde
Formalin
Glutaraldehyde
Halogenated Anesthetics
(Desflurane, Isoflurane, Halothane, Sevoflurane)
Hydrogen Peroxide
Inorganic Arsenic
Isopropyl Alcohol
Lead
Mercury Vapor
Methyl Alcohol
Methyl Chloromethyl ether
Methyl methacrylate
Methyl chloride
Methylenedianiline
Nitrous Oxide
Nitrosodimethylamine
O-Phthalaldehyde
Vinyl Chloride
Xylene

4.0 Laboratory Emergency Equipment

Where chemicals and other hazardous materials are in use, the proper emergency equipment is key to minimizing workplace injuries and protecting employees. It is important to become familiar with the appropriate emergency equipment in your designated work area/building, and the locations you frequent on campus.

Do you know what to do in case of an emergency? It is critical to learn what the appropriate emergency measures are and to be educated on how to use the available emergency equipment.

4.1 Emergency Notification, Response and Evacuation Procedures

Instructions for various emergencies can be found online at:
unomaha.edu/emergency/index.php

UNO's Emergency Operation Plan can be viewed online at:
unomaha.edu/emergency/response-plan.php

4.2 First Aid Kits

First aid kits should be readily available to laboratory staff at all times while they are working in the laboratory. Lab workers shall be trained to know the location of the first-aid kid. Hazard-specific first aid supplies shall be made available, as appropriate.

Factors to consider in selecting a first aid kit: Supplies should be consistent with the types of injuries anticipated within the laboratory space (e.g., will there be burns, cuts, fractures, contusions or allergic reactions?) Its size should be appropriate for the number of people who will be using the kit supplies.

4.2a ANSI Z308.1-1998 Standard

As a practical model, the American National Standards Institute's Minimum requirements for first aid kits (ANSI Z308.1-1998) recommends that basic first aid kits should contain the following:

- Absorbent compress (32 sq. in with no side smaller than 4 in.), 16 adhesive bandages (1 x 3 in), Adhesive tape (total of 5 yd.), 10 individual-use antiseptic applications (0.5g each), 6 individual-use burn treatment application (0.5g each), 2 pairs of medical exam gloves, 4 sterile pads (3 x 3 in.), 1 triangular bandage (40 x 40 x 56 in.)

4.2b Inspection of First Aid Kits

Laboratories shall be responsible to perform monthly inspections by visually evaluating each item within the first aid kit. Personnel shall confirm the contents are in agreement with the listed contents of the first aid kit. Ensure that the items are present in sufficient quantity and, if appropriate, in good working order. Items with expiration dates shall be replaced as needed. Maintain this record within the laboratory. Environmental Health and Safety will validate the monthly inspection of all first aid kits, during the annual laboratory safety inspection.

4.3 Chemical Spill Kits

PI's or laboratory personnel should purchase or make a chemical spill kit to have readily available in their laboratory. Chemical spill kits should be stored in the laboratory, at or near the point of chemical waste generation.

Many different spill kits are available in eSHOP and should be chosen based on the types of chemicals that are being used. Spill kits must be inspected annually, to determine viability of supplies. Store spill kits in an accessible area and make sure all lab personnel know the location and contents of the kit.

At a minimum, all spill kits must contain:

- Splash goggles
- Chemical resistant gloves (will depend on the chemicals you work with)
- Protective outer garments (lab coat, Tyvek suit, shoe covers)
- Chemically compatible spill pads, and/or absorbent material and/or neutralizers.
- Bags and zip ties for holding spill debris

Fisher Scientific has prepared a discounted spill kit for UNO/UNMC Researchers. Please search for catalog # 17-111-228 in eSHOP.

This particular spill kit includes: 10 Pads (15 x 19 in.), 2 Socs (3 in. x 4 ft.), 1 Pair nitrile gloves, 1 Disposable bag, and an Instruction Sheet.

If you need assistance in selecting the appropriate chemical spill kit for your area, please contact Environmental Health and Safety at 402.554.3596.

REPORT ALL CHEMICAL SPILLS. CONTACT PUBLIC SAFETY AT 402.554.2911

4.4 Fire Extinguishers

Fire extinguishers for putting out small fires have been installed in each building on campus. All lab personnel should be adequately trained in the use of fire extinguishers and know where the nearest fire extinguisher is located. Individuals should also know where the nearest fire alarm pull station is located. Fire extinguishers should never be blocked at any time, for any reason. Aisles need to remain clear so that there is a clear path of egress to emergency exits at all times.

All fires must be reported immediately, both active fires and those that have been extinguished. Report all fires to Public Safety at 402.554.2911. Everyone must follow the directions given over the fire alarm system and house paging system and/or in person by Public Safety, Omaha Fire Department or Omaha Police Department. Failure to follow the directions to evacuate may result in disciplinary action.

Fire extinguishers on campus are inspected monthly by UNO Public Safety and inspected annually by General Fire & Safety.

4.5 Safety Showers

Workers in laboratories and other places where biological or chemical agents are used should have fast access to emergency flushing areas. These areas are necessary for the immediate first aid of spills or other incidents. In the event of contact with a chemical or substance, emergency showers should be used for the immediate removal of chemical splashes and spills.

Safety showers are inspected annually to ensure they operate properly. The annual test is conducted by UNO Environmental Health and Safety.

Safety Showers should be kept free from obstructions, at ALL times.

4.5a How to use emergency shower:

The first few seconds after exposure to a hazardous chemical (especially a corrosive chemical) are critical. Delaying treatment, even for a few seconds, may result in irreparable tissue damage. Don't hesitate!

- **Immediately flush the affected area** with copious quantities of water for *at least* 15 minutes.
- Protect the eyes from inadvertent contamination.
- **Remove contaminated clothing**, jewelry, and shoes. Don't let modesty slow you down. Every second counts. Use a clean lab coat or scrubs to provide the victim with privacy and warmth.
- Emergency showers will continue to flow until purposeful steps are taken to stop the flow.
- Grabbing the shower handle and firmly pushing upward on this handle should stop the flow of water.
- **Seek Professional Medical Help**.

4.6 Eyewash Stations

An emergency eye wash station provides a means to remove chemical contamination from the eyes and/or face. Eye stations within laboratory rooms should be tested and recorded weekly by laboratory personnel to ensure water flow and quality. This helps clean out any rust, scale deposits, or bacteria that may accumulate.

Eye wash stations are inspected annually to ensure they meet appropriate standards and regulations. The annual inspection is conducted by the UNMC Facilities Management department. Eye wash stations should be kept free from obstructions, at ALL times.

Wall mounted units, or units in public access areas, are tested on an annual basis only.

4.6a Using an Eyewash Station

If chemicals splash in your eyes, time is of the essence. Go immediately to the nearest eyewash station.

- **Push the Lever to Activate the Unit**
  Push the lever if the unit will activate with one single motion. The dust covers will pop off and the flushing fluid will begin to flow out from the faucet heads.

- **Begin to Flush**
  Get your eyes directly in the stream of the flushing fluid- Immediately!

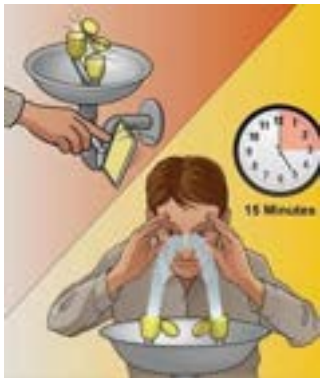
- **Hold Your Eyes Open with Your Fingers**
  Keep your eyes open by holding your eyelids apart with your fingers.

- **Roll Your Eyes**
  Gently roll your eyes from left to right and up and down to be sure that the fluid is flushing all of the areas of your eye.

- **Flush for a Full Fifteen Minutes**
  Continue to flush your eyes for a full 15 minutes. This is important because you want to fully dilute the chemical and wash it out of your eyes. Any time less than 15 minutes is NOT enough time to accomplish this.

- **Take Out Your Contacts**
  If you have contact lenses in your eyes, you can gently take them out while you are flushing. Don't delay the flushing to take out your lenses but make sure that you take them out because they could trap the chemical in your eyes.

- **Seek Professional Medical Help**
  After you have flushed, seek professional medical help to determine if anything more needs to be done for the preservation of your vision.



5.0 Safety in the Laboratory

More than 500,000 workers are employed in laboratories in the U.S. The laboratory environment can be a hazardous place to work. Laboratory workers are exposed to numerous potential hazards including chemical, biological, physical and radioactive hazard, as well as musculoskeletal stresses. Laboratory safety is governed by numerous local, state and federal regulations.

This manual is designed to make employees aware of the standards of laboratory safety. The extent of detail on specific hazards provided in this document is dependent upon the nature of each hazard and its importance in a laboratory setting.

UNO requires all laboratory staff to follow the Occupational Safety and Health Administration (OSHA) standards for laboratory safety. Failure to comply with these safety regulations may result in your laboratory being cited for non-compliance of safety regulations. It is in every employee's best interest to follow the safety regulations to not only protect themselves, but also the other employees in the laboratory.

5.1 Personal Protective Equipment (PPE)

Personal protective equipment is protective gear needed to keep workers safe while performing their jobs. It is a general term used to describe anything you can wear and/or use in order to protect yourself when working with chemical or biological hazards.

It is important that PPE be selected based upon the hazard to the worker, properly fitted and in some cases periodically refitted (e.g. respirators), conscientiously and properly worn, regularly maintained and replaced in accordance with manufacturer's specifications, properly removed and disposed of to avoid contamination of self, others or the environment.

5.1a Types of PPE

Some common examples of PPE used while working in research laboratories include, but are not limited to, lab coats, footwear, gloves, safety glasses, chemical goggles, face shields and respirators. Other types of PPE, such as aprons, thermal protection, coveralls, hearing protection, etc. may be required as determined by the laboratory's hazard assessment.

Laboratory PPE Selection Guide

Lab Coat: Lab coats are worn in the research laboratory to protect your normal clothing against biological or chemical spills and to provide some additional body protection beyond that provided by your normal clothing. Lab coats should fit properly, be clean and have long sleeves.

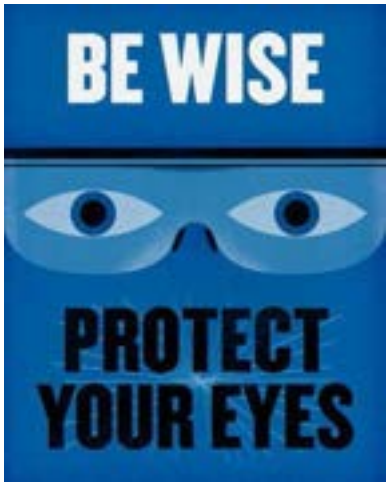
Lab coats are available for purchase on eSHOP or at the UNMC Bookstore. For more information, please contact your departmental supply person or visit the UNMC bookstore's website for at: unmcbookstore.com

Footwear: Closed toe, leather shoes provide the best general protection. This type of footwear provides adequate protection in case of spills, handling heavy objects, tools, or involved in activities where heavy objects may fall onto the feet.

OPENED TOE SHOES ARE NOT ALLOWED IN LABORATORY SPACES.

Eyewear: As a general rule, safety glasses with side shields should be worn at all times in the research laboratory, even if you wear prescription glasses. Safety goggles rather than safety glasses should be the preferred eye protection, whenever a chemical splash is a potential hazard.

It is recommended that individuals do not wear contact lenses when working in a research laboratory. If you do wear contact lenses underneath your goggles, it is important to consider the additional potential risk that your contact lenses may present if dust, caustic reagents or solvents get underneath them and in your eyes. Should you get something in your eyes while wearing contact lenses in the laboratory, remove them immediately before using an eye wash station. Removing your contact lenses in such a situation, may take additional time which increases the risk of injury.



http://magazine.ucla.edu/features/LabSafety-Oct11-inpagetest1.jpg

Face Shield: Whenever the entire face needs protection, a face shield should be worn. This means that any time there is a potential that an aerosol of chemical or biological hazardous material may be created or could splatter. A face shield should always be worn whenever handling tissues samples or animals, where there is the potential for infectious transmission. Safety glasses or goggles should always be worn underneath a face shield for maximal protection.

Gloves: When handling chemical, physical and/or biological hazards that can enter the body through the skin, it is important to wear proper protective gloves. There are several different kinds of gloves: disposable, fabric, leather and metal mesh.

Base selection of glove type and material, on the type of exposure and nature of the hazard. Some chemicals can penetrate gloves that work very well for other chemicals. Some factors to consider when selecting gloves include the chemical type, temperature extremes, cryogenic properties, physical hazards (sharps, piercing objects), pH, toxicity, infectious potential of biological hazards.

The most common glove used on campus are disposable. These gloves are generally used to provide protection against biological and chemical hazards. The two most common disposable gloves found in research laboratories are latex (powder free) and nitrile gloves. Latex gloves provide good general protection in a biological research lab but provide no protection against common chemical hazards. Please note: Powdered latex gloves were banned by the Food and Drug Administration in December 2016 due to their threat as allergens.

In addition to identifying the correct type of glove for your use, it is also important to make sure gloves fit properly. Gloves are commercially available in different sizes.

References for glove selection:
Laboratory PPE Selection Guide
MICROFLEX Chemical Resistance Glove Guide

NO GLOVES ALLOWED
OUTSIDE OF THE LABORATORY!

- Gloves must be removed in the work area before leaving the lab and or touching door handles, elevator buttons, light switch, phones, etc.
- Perform hand hygiene after removing gloves. This prevents contaminating surfaces with chemicals or biologicals and exposing others.
- Carry potentially contaminated equipment or product in a secondary, leak-proof container. The container should be decontaminated after use.

Respirator: Respirators are designed to filter contaminants, either small airborne particles or chemicals (including gases), out of the air. Whenever possible, you should structure your work so that it can be conducted and carried out in a fume hood. It is important to assure the respirator in use fits properly and it has the correct filters to be effective when used with your particular hazards.

The National Institute for Safety and Health (NIOSH) has a Respirator Trusted-Source Information page available at: cdc.gov/niosh/npptl/topics/respirators/disp_part/respsource.html

The information provided on NIOSH's website; can help you make a determination as to what type of respirator you should be using.

All laboratory personnel conducting work in which a respirator is required, must be properly fit tested on an annual basis. The purchasing and fit-testing of the respirator is an expense to be paid by the departmental unit of the employee. To schedule a fit-test, please call EHS at 402.554.2239.

Departments are required to keep an up to date record of all laboratory worker's fit testing certifications. Failure to keep these on file may result in the laboratory being cited for non-compliance of respiratory protection.

PRIOR TO ORDERING, contact Environmental Health and Safety at 402.554.3596 for assistance in selecting the correct respirator for the task and/or if you have any questions about respirator fit-testing and training.

Please note: Standard surgical/dust masks do not require fit testing. If your surgical/dust mask reads NIOSH or N95, that is considered a respirator and you must be fit-tested accordingly.

5.1b Documentation of PPE issuance

A hazard assessment should be completed by the Principal Investigator (PI) or the laboratory manger or supervisor to determine what PPE is necessary for personnel working within the laboratory. All personal protective equipment issued must meet American National Standards Institute (ANSI) standards.

The department shall fund and provide appropriate PPE for each employee or student working within the laboratory. The PI or laboratory manager or supervisor must determine the appropriate PPE needed for procedures in the lab, by conducting a hazard assessment. It is the responsibility of the PI to approve the issuance of appropriate PPE to each employee and/or student conducting research within their laboratory.

It will be the responsibility of each recipient to use the PPE correctly and to keep it clean and in good repair. Proper documentation is required to record the issuance of appropriate PPE for all faculty, staff and student workers working in UNO research laboratories.

5.1c Laboratory Dress Code

All laboratory staff should be dressed in a manner that does not impair safety. Loose clothing, long hair and dangling jewelry may be dangerous around moving equipment and/or hazardous materials. Opened toe shoes are not allowed in laboratories. Shorts and skirts should not be permitted while conducting lab work. Always wear clothing that is appropriate for your job. Wear knee length lab coats, or aprons with arm protectors, while working with hazardous materials. Lab coats should be buttoned to protect your clothing. Long hair should be tied back to prevent hair from being pulled into or becoming entangled with equipment. Avoid wearing loose clothing or dangling jewelry, to also prevent cloth or jewelry from being pulled into or becoming entangled with equipment.

5.2 Housekeeping

Physical hazards and poor housekeeping practices can put lab personnel at risk of injury. Trip hazards such as electrical or computer cords across floors, excess storage in walkways, etc. must be minimized. Irregular, bumpy or loose flooring should be reported to Facilities Management and Planning for repair. Aisles, hallways and corridors must not be used for storage areas.

5.2a Storage of Items

In rooms with automatic sprinklers, no items shall penetrate a plane that is 18 inches below the bottom of the sprinkler heads. This provides for sprinkler coverage to control a fire until the fire department arrives. There are exceptions to the rules for storage or cabinets along perimeter walls, as long as there are no sprinkler heads in close proximity. EHS should be consulted with any questions regarding storage of items in laboratory spaces.

Items should not be stored on the floor, as this prevents the area from being properly cleaned. Items in boxes stored on the floor can be damaged by spills, water leaks and when the floor is mopped. Boxes should be elevated a minimum of 2 inches from the floor.

Aisles must have sufficient width, 36-inch clearance for passing and egress exiting. No items should be placed in aisles that block egress exit paths or that cause obstruction to the required path width.

5.2b Shared Spaces

The initial responsibility for housekeeping and the minimization of physical hazards and injuries in any shared laboratory space is the responsibility all people using the space. It is imperative that all users clean up after themselves. Shared spaces include, but are not limited to, cold rooms, warm rooms, microscope rooms, tissue culture rooms, instrument rooms, etc.

Poor housekeeping is a leading cause of workplace injuries.

Please be courteous & clean up after yourself when using shared spaces.

5.2c Cold Room Guidelines

Cold Rooms must be treated as any other shared laboratory space. In addition to good housekeeping practices to minimize physical hazards, there are additional guidelines for cold rooms that each person must follow. It is the responsibility of each person using the cold room to adhere to these guidelines.

- Each laboratory using a shared cold room is responsible for ensuring that no items stored within the designated storage space are harboring mold.

- All items in the cold room must be labeled with the Principal Investigator's (PI) name. Any items not labeled, are subject to being removed and discarded.

- DO NOT store cardboard or any paper products in cold rooms. Metal or plastic containers are allowed. If some paper products (e.g. Kim wipes) are required, place the item in a closed plastic container between uses. Should visible mold be found on a paper product, discard the item immediately. (see "cellulose containing materials" below)

- DO NOT store dry ice in cold rooms. Cold rooms have minimal or no fresh air exchanges, so storing dry ice can result in asphyxiation.

- Glassware, boxes and equipment should be placed on an open stainless steel shelf or a steel or plastic cart. Open stainless steel shelves permit air flow throughout the entire storage area. Wood shelving units are not permitted inside of cold rooms. Any item being used for storage that is non-compliant is subject to being removed and discarded, if it does not meet the outlined requirement.

- DO NOT store items on the floor. Items left on the floor are subject to being removed and discarded.

- DO NOT leave any items in the sink. Items left in the sink are subject to being removed and discarded.

- DO NOT use 100% bleach on stainless steel items. Bleach is corrosive and can drill a hole through stainless steel. If and when a diluted bleach solution is used as a disinfectant, it is very important that metal surfaces be wiped down with water after being treated with bleach solutions. Thorough rinsing must be done to remove all traces of the bleach solution, because the bleach may discolor or corrode the stainless steel if left on too long. Always wear rubber gloves during this maintenance process.

- Dispose of all trash (paper towels, tubes, etc.) outside of the cold room.

- Promptly clean up any spilled liquid (e.g., buffers, media). Mold can thrive on any organic medium.

- To prevent condensation, close cold room doors and assure the door stays firmly shut.

- Immediately report water leaks or any other mechanical issues to Facilities Management at 402.554.3600.

"Cellulose containing materials"
The storage of cellulose containing materials is a leading cause of mold growth. Mold growth can contribute to contamination of research materials. Preventing mold growth in cold rooms is achieved by controlling condensation/moisture and removing materials contributing to mold growth. The above guidelines must be followed in all cold rooms on campus.

In the event of mold growth, the Principal Investigator will be held responsible for the cleaning, removal and replacement of damaged or contaminated items.

Photos taken during the 2015 safety inspection of cold rooms at UNMC

5.3 Keeping your Lab Secure

Laboratories should be secured when not occupied, evening during business hours. By securing the lab area, it helps prevent damaging or stealing of equipment and supplies. Acute toxins, select agents, controlled substances and radioisotopes must be appropriately secured. All staff are required to have their employee ID badge (MavCARD) when working on campus.

Do not hesitate to politely question anyone whom you do not recognize, or whom you believe does not belong in the area. If there is any concern about lab security or suspicious individuals, please contact Public Safety at 402.554.2911.

5.3a Restricted Access: Tailgating & Piggybacking

In security, tailgating or piggybacking refers to when a person tags along with another authorized person to gain entry into a restricted area or pass a certain checkpoint.

Not everyone with an ID badge has authorization to enter all areas. Employees, faculty, and students should always use their own ID badge to enter restricted and secured areas, in which they have authorization to enter. Using another employee's or student's ID badge to enter secured areas is prohibited and may result in disciplinary action.

DO NOT ALLOW OTHER INDIVIDUALS ACCESS WITH YOUR ID BADGE.

5.4 Working Alone/Unattended Operations

Hazardous experiments shall not be conducted alone in the laboratory. It is vitally important not to cover or black out lab door windows, so the lab may be observed.

Operations and experiments that continue unattended for several hours or overnight must be pre-approved by the PI or laboratory manager/supervisor. Plans should be made to eliminate the risk of hazards in the event of failure in power, water, gas or other service. Water cannot be left running, unattended.

5.5 Visitors

A laboratory visitor is any person who is not assigned to work in the laboratory space on a regular basis. All visitors must be escorted and supervised by laboratory personnel at all times while the visitor is in the laboratory.

Visitors should adhere to all lab safety policies and procedures. Lab personnel should advise all visitors of the potential hazards within the laboratory and provide the appropriate PPE, if required.

5.5a Children in the Workplace

UNO does not permit the presence of children in the workplace. Parents are responsible for childcare arrangements and planning alternatives for childcare. Parents may use vacation time when childcare issues arise. Please refer to the Children in the Workplace Policy.

5.5b Pets in the Workplace

Employees, students, faculty, staff, volunteers and visitors are not allowed to bring pets to the workplace or inside any building where UNO provides functions or services. Please refer to the Pets in the Workplace Policy.

5.6 Food, Drink, Cosmetics Use in Laboratory Areas

The use of food, drink, candy, handling contact lenses and/or the application of lotion, lip balm or cosmetics are not allowed in any areas where chemical, biological or radioactive materials are used or stored. Use of food, drink and the application of cosmetics are only permitted in rooms where chemical, biological or radioactive materials are not used or stored. If a room is located within the area where these materials are used or stored, this room must have four walls (floor to ceiling) and a door (not an opening without a door), e.g., an office within a laboratory.
Food and drinks must be covered prior to transporting through an area where a hazardous material is used or stored.

Hands should be washed after removing gloves and prior to handling food, drinks, contact lenses, applying cosmetics or any other hand to face activities. Food and drinks may be placed in the corridor outside the lab if doing so does not violate fire codes and the container is covered.

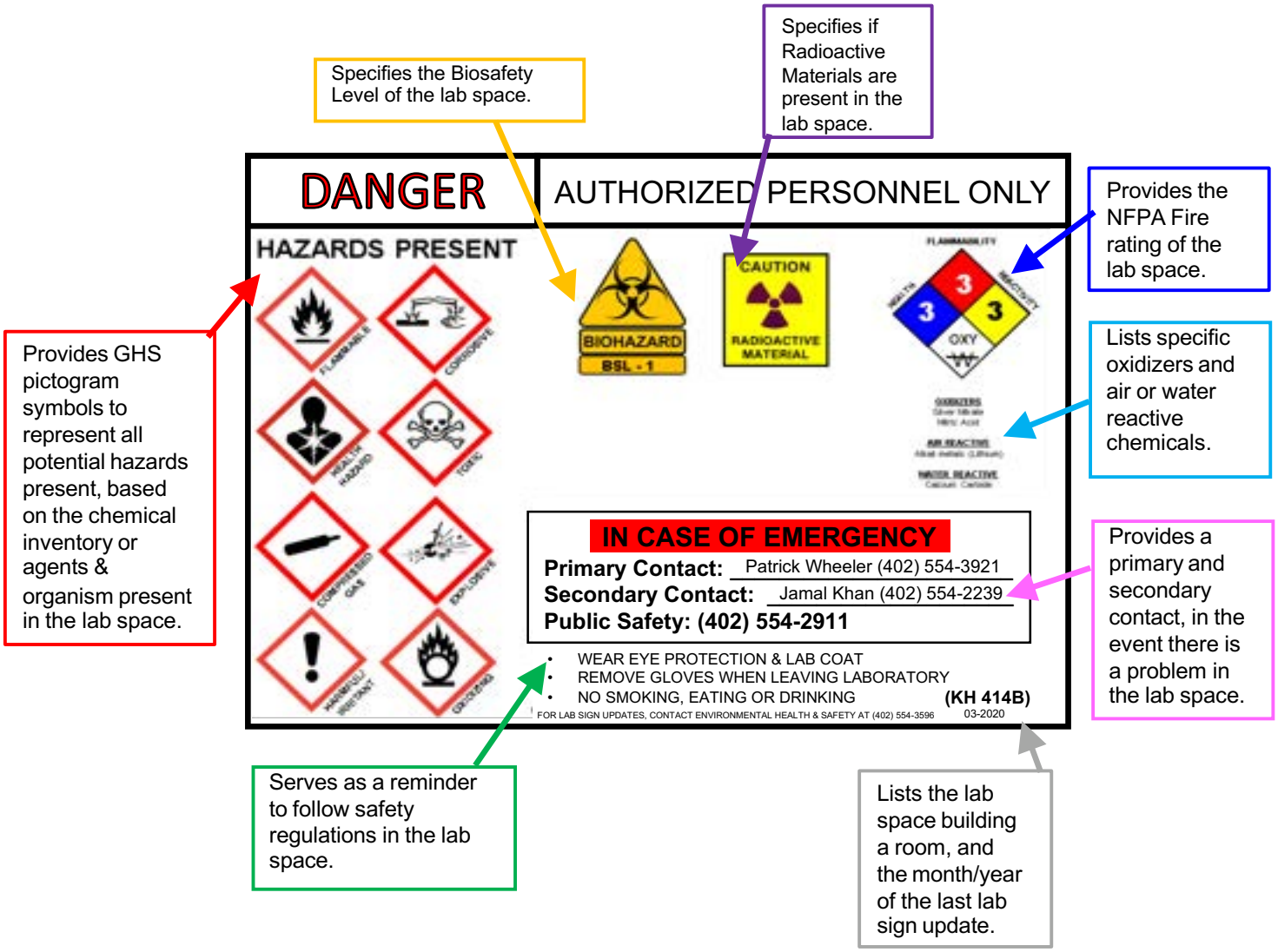
6.0 Laboratory Safety Signage

The laboratory sign provides information to Security, Facilities Management and Planning, Environmental Services, Emergency Response Agencies, etc. The contact information is provided so those knowledgeable about the hazards can be contacted if more information is needed or in the event there is a problem in the laboratory.

UNO Environmental Health and Safety requires all laboratories to update their lab sign every two years or when/if there is a change in primary or secondary contacts, or a change of chemicals being used and/or stored in the lab. Laboratory signs are created and posted by Environmental Health and Safety at each corridor door leading into the workspace.

Laboratory safety signage information can also be found online at: info.unmc.edu/safety/safety-office/lab-safety/lab-signs.html. You will need to sign in with a UNMC log in.

What does a lab sign consist of?



6.1 Laboratory Sign Worksheet

To obtain a laboratory sign, a laboratory sign worksheet must be completed and submitted to the Environmental Health and Safety Office. This information is very important, as it is used to provide information to emergency response personnel about the hazards present in the area. One worksheet should be completed for each room.

When completing the lab sign worksheet, it is important to list a primary and secondary contact that are knowledgeable of the hazards present in the area. In the event of an emergency, the contacts listed on the lab sign may be called for additional information regarding the lab space.

The laboratory sign worksheet will be found on at ehs.unomaha.edu or by calling 402.554.3921.

The laboratory sign worksheet is an Adobe Acrobat PDF fillable form. The last page of the worksheet includes buttons to save the form, print the form and submit the form to EHS via email. It is recommended that you rename the file when you save it to your computer and keep a copy for your records before submitting a copy to Environmental Health and Safety.

**MAC users: Please do not fill out the form in "preview mode," as the text entered in the fields are not visible when the worksheet it submitted.*

6.2 Laboratory Sign Workbook

In order to complete the Laboratory Sign Worksheet, you will need to reference the lab sign workbook. The laboratory sign workbook includes both Chemical Information and Biohazard Organisms/Agents.

Appendix A: Chemical Information
Appendix B: Biohazard Organisms/Agents

To answer questions 10 of the lab sign worksheet, please refer to Appendix B of the laboratory sign workbook.

To complete pages 6 & 7 of the lab sign worksheet, please refer to Appendix A of the laboratory sign workbook.

It is important to list all chemicals used and/or stored in each area. This information will be used to determine the appropriate hazard ratings to include in the NFPA fire diamond on your lab sign. Emergency response personnel use this information to quickly determine what hazards are present in the area.

6.3 Laboratory Safety Poster

Laboratory safety posters are distributed by UNMC Environmental, Health and Safety. Posters are to be displayed within the laboratory for all staff to have immediate access to the information listed. Posters should not be placed on doors or windows.

The Laboratory Safety Poster provides a brief summary of laboratory safety procedures, chemical spill information, important phone numbers, and emergency preparedness information.

6.4 Laboratory Emergency Contacts

Each laboratory is required to provide emergency contact information for notification of emergencies within their designated lab space(s). Emergency contact information provided will not be listed on the laboratory sign posted outside of the laboratory entrance. Emergency contact information will only be provided to Public Safety Dispatch for use in the event of an emergency situation and contact is needed after hours.

All contacts listed should be knowledgeable about the contents of the laboratory space. Emergency Response personnel may ask that individuals be contacted for technical information during emergencies. If emergency contacts or phone numbers change, please contact EHS to update your records in a timely manner. Laboratories should review their emergency contact lists on a annual basis to ensure the most current information is provided in the event of an emergency.

Emergency contacts will be called in the order listed on your submitted form. It is recommended that the laboratory Principal Investigator (PI) be the first point of contact.

SAMPLE OF FORM:

Laboratory Emergency Contact Information

Emergency contacts will be called in the order listed below.

Building: _____ Room(s): _____

Department: _____

Lab Space Assigned to: _____

Primary Contact:

First & Last Name: _____

Home Phone: (_____)_____Cell Phone: (_____)_____

Secondary Contact:

First & Last Name: _____

Home Phone: (_____)_____Cell Phone: (_____)_____

Alternate contact:

First & Last Name: _____

Home Phone: (_____)_____Cell Phone: (_____)_____

7.0 Safety Training

While working in a research laboratory you will likely use instruments, materials and reagents that have the potential to harm you, your co-workers and the environment. Consequently, it is important to spend time at the beginning of your project to learn the safety standards of your discipline and workplace to insure everyone's good health and safety.

Effective training is critical to creating a safe environment and for the prevention of laboratory incidents. ***Formal laboratory safety training is a requirement for all individuals working in laboratories on campus.*** Meeting safety training requirements is a cooperative effort between Environmental Health and Safety, Office of Research and Creative Activity (ORCA), Principal Investigators (PI), laboratory supervisors and laboratory staff and students.

Based upon the nature of the research work you will be doing; you may also be required to complete additional training. Additional training is required for individuals that work with radioactivity, biohazard agents, research animals, the handling of chemical waste, and chemical spill mitigation.

Accurate record keeping of training activities demonstrates a commitment to the safety and health of the UNO community, integrity of research and protection of the environment. Departments are required to document and record all health and safety training, including safety meetings, one-on-one training, classroom and on-line training provided, in addition to any ***required*** training.

7.1 General Lab Safety Training

Laboratory Safety Training is training that is presented upon request that covers safety issues related to those who work in laboratory settings. It includes bloodborne pathogens, electrical safety, fire safety, radiation safety, hazardous material safety, latex allergies, waste disposal, etc. For additional information on general lab safety training, please contact EHS at 402.554.3596.

7.2 Chemical Safety Training

Environmental Health and Safety has developed a comprehensive training program which provides specific skills and knowledge to employees who handle hazardous and radioactive material. These programs ensure that UNO remains in compliance with the applicable federal, state and local rules and regulations. There is a training element to each of these programs to provide job-specific information to employees and to keep workers up to date on changing regulatory requirements.

7.2a Department of Transportation (DOT) Hazardous Material Shipping

Application of the DOT regulations concerning the **transport** of Hazardous Material. Training ensures that a hazmat employee has familiarity with the general provisions of the regulations, is able to recognize and identify hazardous materials, has knowledge of specific requirements applicable to functions performed by the employee, and has knowledge of emergency response information, self-protection measures and accident prevention methods and procedures. Training must include:

- General awareness/familiarization training. Each hazmat employee shall be provided general awareness/familiarization training designed to provide familiarity with the DOT requirements.
- Function-specific training. Each hazmat employee must be provided function-specific training concerning requirements that are specifically applicable to the functions the employee performs.
- Safety training. Each hazmat employee shall receive safety training concerning:
- Emergency response information required by the (DOT)
- Measures to protect the employee from the hazards associated with hazardous materials to which they may be exposed in the workplace.
- Methods and procedures for avoiding accidents, such as the proper procedures for handling packages containing hazardous materials.

Security awareness training:
Each hazmat employee must receive training that provides an awareness of security risks associated with hazardous materials transportation and methods designed to enhance transportation security. This training must also include a component covering how to recognize and respond to possible security threats.

In-depth security training:
UNO is required to have a security plan in accordance with the DOT regulations. A hazmat employee who handles hazardous materials covered by the plan, performs a regulated function related to the hazardous materials covered by the plan, or is responsible for implementing the plan must be trained concerning the security plan and its implementation. Security training must include company security objectives, organizational security structure, specific security procedures, specific security duties and responsibilities for each employee, and specific actions to be taken by each employee in the event of a security breach.

Required: For all persons shipping Dangerous Goods and Radioactive Material (in accordance with their level of responsibility and job function).

Frequency: Initial and refresher once every three years

7.2b Internal Air Transport Association (IATA) Dangerous Goods Shipping

Application of the IATA regulations concerning the transport of dangerous goods. Training must include:

- General familiarization training which must be aimed at providing familiarity with the general provisions.
- Function specific training which must provide detailed training in the requirements applicable to the function for which that person is responsible
- Safety training which must cover the hazards presented by dangerous goods, safe handling and emergency response procedures.
- Security awareness training that addresses the nature of security risks, recognition of security risks, methods to address and reduce such risks and actions to be taken in the event of a security breach. It should include awareness of security plans (if appropriate) commensurate with the responsibilities of individuals and their role in implementing security plans.

Required: For persons shipping all dangerous goods, radioactive material, infectious substances Category A or B and dry ice. (Exempt Human or animal specimens).

Frequency: Initial and refresher once every two years

7.2c Regulated Medical Waste Shipping

Application of the DOT regulations concerning the transport of regulated bio-hazardous waste under the proper shipping name Regulated Medical Waste (RMW). Training must include all of the requirements associated with the transport of hazardous materials (DOT), including Security Awareness, with emphasis on the specific requirements for shipping Regulated Medical Waste.

Required: For persons who sign the Regulated Medical Waste shipping papers

Frequency: Initial and recurrent once every three years

7.2d Universal Waste Training

Required training for all personnel who handle Universal Waste. A large quantity handler of universal waste must ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures, relative to their responsibilities during normal facility operations and emergencies.

Required: All personnel who handle Universal Waste

Frequency: Initial and yearly refresher

7.3 Radiation Safety Training

The State of Nebraska regulations and conditions of the UNMC's broad scope radioactive material license (which also includes UNO) dictate training requirements to work with ionizing radiation sources. The extent of training will vary upon the type and frequency of radiation used. For additional information please contact EHS/Radiation Safety at 402.559.6356. Training requirements can be found on-line at: Radiation Safety Training

7.4 Biosafety Training

Any individuals working with or having access to biohazardous materials is required to complete training in order to receive IBC approval. For additional information on required Biosafety Training Modules please visit the IBC website: unmc.edu/ibc/training/index.html

7.5 Research Animals – Occupational Health & Safety Training

Animal Use and Facility Access Requirements must be completed prior to entering animal facilities or having contact with research animals at UNO. Please note that some requirements may require periodic renewal. You will be notified when/if renewal is required. If you have any questions regarding UNO's Research Animal and associated Occupational Health & Safety training, please contact the Coordinator of Animal Care at 402.554.2943.

8.0 Laboratory Equipment

Each PI and/or laboratory manager/supervisor is responsible for the maintenance and operating condition of each piece of equipment within their laboratory space(s). Checking equipment for operating condition, before each use, will help prevent injuries from occurring.

Equipment shall be routinely calibrated, cleaned and maintained per manufacturer's specifications. This process will make sure that the equipment performs as expected during hypothesis testing or validation of research protocol and will help to minimize the hazard to the operator. Ideally, a log that details calibration and maintenance actions will be maintained for each piece of equipment.

Defective equipment shall be labeled as "DO NOT USE" and repaired in a timely manner. Non-working equipment, that will no longer be used, should be removed from the lab space to eliminate clutter within the lab.

It is important that equipment in the laboratory be labeled with any hazards that may be present with the equipment. Equipment stickers can be obtained by contacting EHS at 402.559.9913.

- All equipment that is used to store and/or work with biohazardous agents (i.e. centrifuges, refrigerator, incubator, etc.) shall be labeled with a biohazard sticker.
- Refrigerators/freezers shall be labeled with the "Non-Explosion Proof" sticker.
- Microwave ovens and ice machines shall be labeled with the "Not for Human Consumption" sticker.
- All equipment devices related to radioactivity, shall be labeled with the "CAUTION: Radioactive Material" sticker.

8.1 Electrical Safety

The hazards associated with the use of electricity include electrical shock and electrical fires caused by shorts and overloaded circuits or wiring. Sparks from electrical equipment can also serve as an ignition source for flammable or explosive vapors or combustible materials.

Never obstruct electrical panels or disconnect switches. A minimum of 3-foot clearance must be maintained around electrical panels at all times to permit ready and safe operation and maintenance of such equipment.

Inspect all electrical equipment (stirrers, centrifuges, hot plates, microwaves, etc.) before use to ensure that cords and plugs are in good working condition. Electrical outlets, wiring, and other electrical equipment integral to the building may only be repaired by the direction of Facilities Management. If you have any issues with electrical outlets in your laboratory, please call the Facilities Service Desk at 402.554.3600 for assistance.

8.1a Space Heaters

Portable space heaters are prohibited from use on campus without specific approval from Facilities Management and Planning. See the UNO Building Temperature Policy for details.

8.1b Electrical Cords

Electrical cords and plugs must be inspected routinely to identify cracked insulation or broken plugs. Any equipment found with damaged cords or plugs must be removed from service until it is repaired. Wrapping broken insulation with electrical tape is not an acceptable repair method. Electrical cords cannot be run across floors, under rugs, through walls, doors, windows, over ceiling tile or around sharp edges or corners where they can be damaged or cannot be inspected for damage. Cords must also not be run around or near sinks.

8.1c Extension cords

Extension cords cannot be used to provide power to laboratory equipment. Extension cords are prohibited as a substitute for permanent building wiring and outlets. Fused circuit breaker bars may be used for some equipment, but they cannot be ganged, or daisy chained together.

Equipment such as refrigerators, freezers, microwaves, toasters, coffee pots, etc. cannot be powered with breaker bars and must be plugged directly into outlets. In addition, extension cords should not present above ceiling tiles or running through doorways, as this violates code and may cause damage to the cord causing a short and electrocution.

8.2 Refrigerators & Freezers

The PI and/or the laboratory manager or supervisors have the primary responsibility of oversight of the refrigerated units within their laboratory space(s). Refrigerators/freezers used for chemical storage must have signs indicating their purpose. Food and drinks are not permitted in laboratory refrigerators/freezers.

Explosion-safe or laboratory-safe refrigerators/freezers must be used. These units have no electrical sparking devices, relays, switches, or thermostats that could ignite flammable vapors inside the unit.

8.2a Safety Guidelines for Refrigerators & Freezers

- NEVER store food or drink in any refrigerator or freezer used in a laboratory.
- Refrigerator and freezer units must be plugged directly into the wall outlet. The used of extension cords or power strips is not permitted.
- Ensure that all chemicals stored in the refrigerator are compatible.
- Chemicals should be allowed to warm to room temperature before sealing to prevent pressure buildup
- All containers placed in a refrigerator/freezer should be completely sealed or capped and safely positioned.
- Containers with screw-top lids shall be secured with parafilm or placed in plastic bags.
- Shelves in refrigerators should all have suitable plastic trays for secondary containment. If plastic trays are not available, liquid chemicals should be placed in secondary containers to contain a spill.
- All items in a refrigerator must be appropriately dated and labeled.
- Store only chemicals in amounts needed over a reasonable amount of time. Each chemical has a shelf life and may form decomposition products that can be hazardous.
- An inventory should be posted on the outside of the refrigerator.
- Chemical refrigerators/freezers should be located away from laboratory exits.
- Refrigerators/freezers should be cleaned-out and manually defrosted at least annually or more frequently as needed.

8.2b Water-cooled Ultralow Freezers

Reserved for future use

8.2c Equipment Alarm System

Under construction

8.3 Centrifuges

Centrifuges, which operate at high speed, have great potential for injuring users if not operated properly. Unbalanced centrifuge rotors can result in injury or death. Sample container breakage can release aerosols that are harmful if inhaled. The majority of all centrifuge accidents result from user error. TO avoid injury laboratory personnel should follow the manufacturer's operating instructions for each make and model of centrifuge being used.

When centrifuging infectious materials, wait 10 minutes after the rotor comes to a complete stop before opening the lid. If a spill occurs, use appropriate decontamination and cleanup procedures for the spilled materials. Report all incidents/accidents immediately.

Each operator must be trained on proper operating procedures, in accordance with the manufacturer's operation guidelines. A log should be kept detailing operation for centrifuges and rotors. Service should be performed in accordance with the manufacturer's guidelines. If you have any questions regarding the servicing of centrifuges, please contact Kevin Barton, at 402.554.2512 or via email: kbarton@unomaha.edu

8.3a Safety Guidelines for Centrifuges

-Ensure that centrifuge bowls and tubes are dry
-Ensure that the spindle is clean
-Use matched sets of tubes, buckets and other equipment
-ALWAYS use safety centrifuge cups to contain potential spills or prevent aerosols. This is a mandatory requirement for all Biosafety Level 2 and above laboratories.
-Inspect tubes or containers for cracks or flaws before using them.
-Avoid overfilling tubes or other containers
-Ensure the rotor is properly seated on the drive shaft
-Make sure tubes, or containers, are properly balanced on the rotor
-Only check O-ring on the rotor if you are properly trained
-Apply vacuum grease in accordance with the manufacturer's guidelines
-Do not exceed the rotor's maximum run speed
-Close the centrifuge lid during operation
-Make sure that the centrifuge is operating normally, prior to leaving the area
-Make sure that the rotor has come to a complete stop before opening the lid.

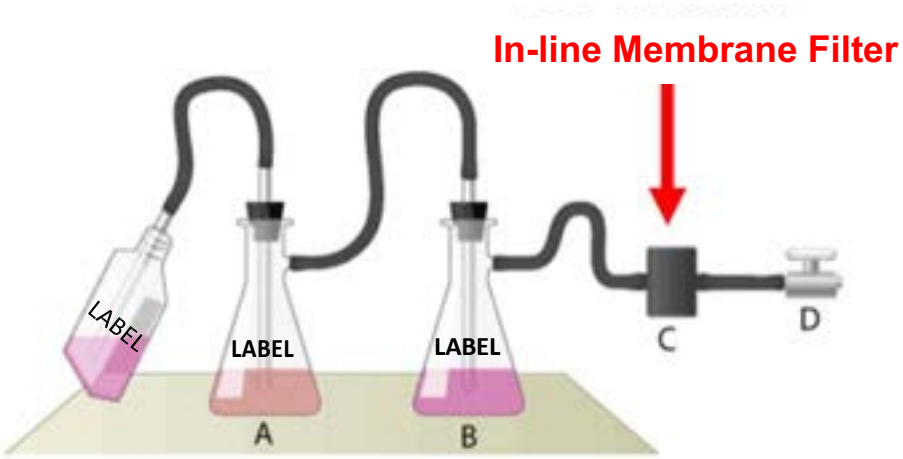
When centrifuging infectious materials, wait 10 minutes after the rotor comes to a complete stop before opening the lid. If a spill occurs, use appropriate decontamination and cleanup procedures for the spilled materials.

8.4 Vacuum Systems

Vacuum systems can pose severe implosion hazards and the possible hazard of flying glass, splattering chemicals and fire. Vacuum operations shall be set up and operated with careful consideration of the potential risks. Use the appropriate personal protective equipment at all times when using vacuum systems. Be sure to label collection bottles appropriately, to indicate what chemicals are present within the bottle.

8.4a Vacuum Trapping

An appropriate vacuum trapping system is comprised of a filtering flask (labeled as to the contents), appropriate sized tubing (thick enough to prevent collapse while under a vacuum), and a membrane filter placed prior to the vacuum source (to protect the vacuum source from contamination and moisture damage).



Note: One filtering flask is appropriate when an in-line membrane filter is provided. The glass or plastic tube that is inserted into the rubber stopper of the filtering flask should extended at least 3 inches below the suction port on the side of the flask.

In-line membrane filters are available for purchase through eSHOP. Below is information on the recommended filter, which is sold in packs of 10 from Fisher Scientific.

EMD Millipore Millex™ Filters: Inlet and Outlet for Latex Tubing

Protect vacuum sources from contamination and moisture damage

Manufacturer: EMD Millipore SLFA05010

Filter Units (50mm dia.), Millex Vacuum Line Protection and Tank/Bioreactor Venting; Inlet and outlet:Stepped hose barb with female Luer slip interior. For latex tubing;; Pore Size: 1.0um

View all options for this product

8.5 Glassware

Glassware is used in almost every type of chemical and biological laboratory. Dependent upon processes being performed, specific safety precautions should be taken to reduce the risk of breakage and implosions. Glassware is designed for a specific purpose, and it should only be used for that purpose. “Makeshift” apparatus may be unstable and can lead to accidents and injuries.

When selecting glassware, determine the compatibility of the glassware with the chemicals or process being used. Chemicals can react with glass or cause damage to glass. If your process involves temperature or pressure changes, ensure that the glassware can withhold these types of changes.

Always inspect glassware for flaws before you begin working with it. If defects are discovered, the item should be removed from service. Scratches in glass can grow into cracks later on. Dispose of flawed glassware if repairs are not possible.

Glass is fragile and can easily break. When glass breaks, cautious care should be taken to reduce the risk of injury. Wear cut-resistant gloves when handling broken glass.
When cleaning broken glass, use mechanical means to pick up the pieces. Tongs, tweezers, or forceps should be used to pick up large pieces of broken glass. Small shards can be picked up using a wet paper towel. Proper disposal of glassware ensures that others aren’t injured by improperly disposed of broken glass.

8.5a Proper Disposal of Glassware

<u>Contaminated broken glassware:</u>
Place contaminated broken glassware into a cardboard box, seal it shut and then placed within the red biohazardous waste bin for proper disposal by Environmental Services.

<u>Uncontaminated broken glassware:</u>
Place uncontaminated broken glassware in a cardboard box or rigid container that is labeled "Broken Glass/Trash" for proper disposal by Environmental Services. Please remember not to over-fill the broken glass/trash boxes.

If additional information is needed on disposal of glassware, please contact Environmental Services at 402.554.2500.

Glass disposal boxes can be purchased on-line through eSHOP.

8.5b Safe Handling Guidelines for Glassware

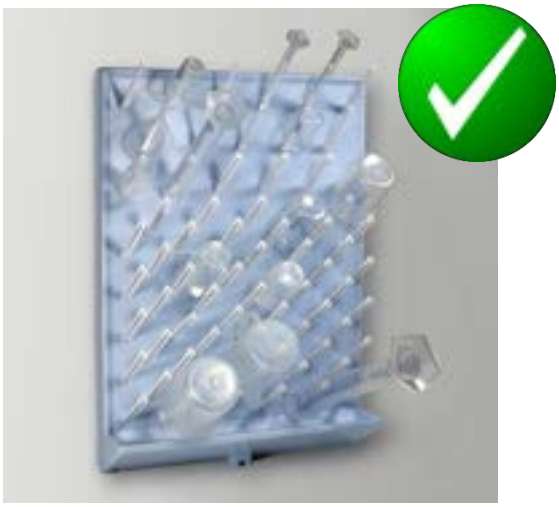
Proper handling of glassware can help reduce the risk of injury and/or an accident.

- Never carry a flask by the neck
- Never carry a beaker by the side
- Use two hands when carrying any glassware (position one hand under the glass for support)
- Wear appropriate gloves when there is a risk of breakage (i.e. inserting a glass rod, chemical contamination or thermal hazard)
- When handling hot or cold glassware, always wear insulated gloves
- Do not heat or cool glassware, unless it is designed for that purpose. Check with the glassware manufacturer to determine safe temperature usage.
- When using a Bunsen burner to heat glassware, the flame should touch the glass below the liquid level
- Use hotplates that are larger than the bottom of the vessel being heated
- Ensure the necessary settings on hotplates are activated (if you do not intend to heat, be sure that the hotplate is NOT turned on)
- Do not set hot glass on cold or wet surfaces
- Glassware should be cooled slowly to prevent breakage
- Keep glassware stored away from shelf edges
- Place glassware toward the back of benches or hoods (Please note: Fume hoods and biosafety cabinets should not be used for storage)

8.5c Cleaning and Drying Glassware

To ensure good lab techniques, it is necessary that glassware be physically clean, chemically clean and in many cases, sterile.

- Eye protection and heavy-duty slip-resistant and chemical resistant gloves should be work when washing glassware
- New glassware should be washed prior to use, to remove any residue or loose particles
- Wash glassware as quickly as possible after use
- Do not overload sinks, soaking bins, countertops, etc.
- Keep all glassware clear of the sides of the sinks, and away from the eyewash units
- When drying glassware, place items on towels, a lined basket, slip-resistant pads or glassware should be hung on the drying board pegs



8.6 Heating Devices

Heating devices are the most common type of electrical device found in the laboratory. Although much safer than Bunsen burners, these devices pose electrical and fire hazards if used improperly.

- Never reach over an open flame or hot plate
- Never touch hot objects with your bare hands
- Tie back long hair, secure any loose clothing, and put on safety goggles before using a heating device.

8.6a Lab Ovens

Laboratory dryers, oven and washer are primarily used for the washing and drying of glassware and plastic, as well as for removing water or other solvents from chemical samples. Using these types of equipment pose fire and health hazards to the user and the area around it.

Fire Hazard: Melting plastic can cause fires.
Placing plastic items that are NOT made to withstand high temperatures into the machine can potentially cause them to melt and ignite. This can set fire to the equipment itself and the room. If you are not sure, DO NOT use it.

Health Hazard: Volatilized substances pose acute or chronic respiratory hazards.
Rinsing items with volatile substances, or not rinsing away residual volatile substances in the equipment before putting them in the dryer will cause the substance to become airborne. Machines do not have a way to contain the gas, and it can escape and be inhaled by the operator and/or those around the machine.

Burn Hazard: Hot surfaces and materials.
Use extreme caution of hot surfaces when loading and unloading items. Contents will be extremely hot. It is important to keep your face, body and hands away from escaping heat and steam when opening the door of the machine.

- **Read and understand the proper operating and safety procedures outlined in the owner's manual.**
- **Make certain that new personnel are trained on the proper and safe operation of equipment.**
- **Be aware of what you are doing and follow proper safety procedures.**
- **Ensure equipment is in good working condition, prior to using. Run equipment checks when possible.**
- **DO NOT overload the machine.**
- **DO NOT exceed recommended operating temperatures.**
- **DONOT plug in equipment with extension cords.**
- **DO NOT place any items on top of a laboratory oven.**
- **DO NOT place combustibles near equipment.**

8.6b Hotplates

Hotplates are frequently used in the laboratory to perform chemical reactions, to heat samples, and for numerous other activities. Hotplates are conceptually simple – a flat surface with heating elements. They do not produce open flames and are well suited for oil or sand bath use. There are key considerations on the proper choice of hotplates and important safety factors that users should be aware of.

Laboratory hotplates are normally used when solutions must be heated above 100 degrees Celsius. Hotplates should be designed specifically for laboratory use. Household type units should never be used in the laboratory. Hotplates with exposed heating elements or spark producing switches should not be used to heat flammable liquids. Care should be exercised when heating solvents on hot plates with enclosed elements to ensure that the liquid does not boil over into the electrical heating equipment.

8.6c Open-Flame Devices

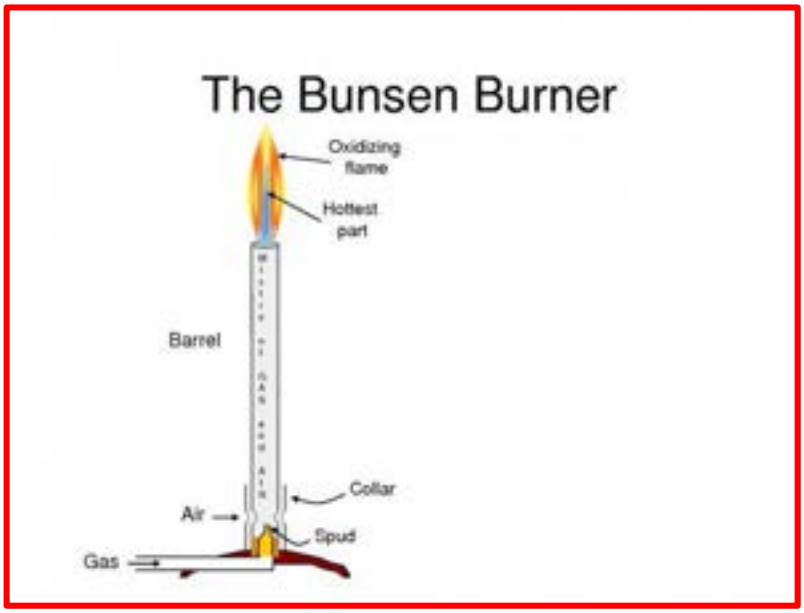
Candles, torches, butane burners, and any other flame producing devices are considered “open flame devices.” Open flame devices carry with them the risk of unintentional fire and serious consequences when not used appropriately. Open flames should not be used to heat flammable liquids. Before lighting an open flame ensure that all flammables have been removed from the area and that all flammables are tightly closed. Use only non-sparking electrical devices to heat flammable liquids.

Bunsen burners are used in several research laboratories for sterile culture processing. Using alternative equipment for sterilization can reduce the risks associated with the use of open flames. Labs should consider alternatives such as bacti-cinerator or disposable sterile loops for inoculation. Spare gas cylinders must be safety and properly stored.

8.6d Reserved for future use

8.6e Bunsen Burner Safety Guidelines

- Place the Bunsen burner away from any overhead shelving, equipment or light fixtures by at least 12 inches.
- Remove all papers, notebooks, combustible materials and excess chemicals from the area.
- Tie-back any long hair, dangling jewelry, or loose clothing.
- Inspect hose for cracks, holes, pinch points or any defect and ensure that the hose fits securely on the gas valve and the burner. Replace all hoses found to have a defect before using.
- Notify others in the laboratory that the burner will be in use.
- Use a sparker/lighter with extended nozzle to ignite the burner. Never use a match to ignite a burner.
- Have the sparker/lighter available before turning on the gas.
- Adjust the flame by turning the collar to regulate air flow and produce an appropriate flame for the experiment (typically a medium blue flame).
- Do not leave open flames unattended and never leave the laboratory while the burner is on.
- Shut off gas when its use is complete.
- Allow the burner to cool before handling. Ensure that the main gas valve is off before leaving the laboratory.



8.7 Lasers

Lasers are capable of causing eye injury to anyone who looks directly into the beam or specular reflections. High power laser beams can burn exposed skin, ignite flammable materials, and activate toxic chemicals that release hazardous fumes, gases, debris, and radiation.

Only qualified and authorized persons shall be permitted to operate a laser. The Principal Investigator determines the employee's operational qualification from departmental or technical training or other acceptable learning experience. Operators shall use appropriate PPE at all times when operating any type of laser devices. Certain types of lasers may require additional training, engineering controls and safeguarding.

8.7a Laser Equipment Data Form

All laboratories are required to submit the Laser Equipment Data Sheet to Environmental Health & Safety (EHS). Based upon the information submitted, a representative from EHS, may contact you to conduct an inspection of the laser. A copy of this form can be requested by emailing unoehs@unomaha.edu

8.7b Laser Classification

Lasers are generally classified and controlled according to the following criteria:

- **Class 1**: Low-power lasers and laser systems that cannot emit radiation levels greater than the Maximum Permissible Exposure (MPE). Class 1 lasers and laser systems are incapable of causing eye damage and are therefore exempt from any control measures.
- **Class 2**: Visible, low power lasers or laser systems that are incapable of causing eye damage unless they are viewed directly for an extended period (greater than 1000 seconds).
- **Class 3**: Medium-power lasers and laser systems capable of causing eye damage with short- duration (<0.25 s) exposures to the direct or specularly reflected beam. Includes Class 3a and 3b lasers.
- **Class 3a**: Lasers or lasers systems that normally would not produce a hazard if viewed for only momentary periods with the unaided eye. They may present a hazard if viewed using collecting optics.
- **Class 3b**: Lasers or lasers systems that can produce a hazard if viewed directly. This includes intrabeam viewing of specular reflections.
- **Class 4**: High power lasers and laser systems capable of causing severe eye damage with short-duration (<0.25 s) exposures to the direct, specularly reflected, or diffusely reflected beam. Class 4 lasers and laser systems are also capable of causing severe skin damage and igniting flammable and combustible materials.

8.8 Maintenance of Equipment

Maintenance of all laboratory equipment is the responsibility of the PI. Each PI shall follow the manufacturer guidelines for the maintenance of each laboratory equipment piece. Records of maintenance should be kept on file within the laboratory.

8.9 Reserved for future use

8.10 Disposal of Equipment

Unwanted or non-working laboratory equipment should be disposed of in a timely matter. Furniture Stores provides pick up services for all surplus furniture and equipment on campus. All equipment should be properly cleaned and decontaminated, if necessary, prior to disposal.

To request furniture or equipment pick-up, please call 559-5895 for assistance. E-shop users can request pickups on-line by clicking on the Surplus Property Pickup Form (see below).

9.0 Laboratory Engineering Controls

Laboratory staff may not perform any modifications of any utility systems in buildings or labs. No part of the ventilation, electrical, plumbing (water and gas) may be tapped into, repaired, removed added or tampered with in any way by anyone except Facilities Management and Planning (FMP) personnel or subcontracted licensed contractors. If work needs to be done on these systems, please submit a work order to FMP. Go to Submit a Request for Services to submit your request.

9.1 Fume Hood & Biosafety Cabinet Manual

Biological Safety Cabinets are designed to minimize dangers inherent in work with biological materials assigned to biosafety levels 1, 2, or 3. These cabinets also provide physical isolation and containment of biological hazards and their by-products. BSC's offer product, personnel, and environmental protection.

Fume Hoods are designed to protect laboratory personnel by capturing, conveying, and/or containing contaminates such as chemical vapors, gases, dusts, mists, and fumes before they escape into the laboratory environment. Fume Hoods offer personnel protection only.

This manual has been developed to provide information regarding the selection, performance, safety, and inspection of fume hoods and biological safety cabinets.

See the Fume Hood & Biosafety Cabinet Manual for details.

9.2 Laboratory Ventilation Systems

Room Air Pressure should be negative to the hallway so that accidental releases are kept in the lab and not released into the hallway and the building. Do not block or cover supply and exhaust vents. Occupant changes to lab ventilation may compromise the safety features of the laboratory and local exhaust systems such as fume hoods, biosafety cabinets, etc.

9.3 Fume Hood controls operations instructions

Not applicable

9.4 Plumbing Systems

Using a strainer in your sink drains will prevent objects from falling into the sanitary drain system. If experimental procedures will require connecting laboratory apparatus to any plumbing, personnel must also know how to avoid improper connections (i.e., avoiding mistakes such as connecting to the wrong system or making an inappropriate cross connection).

9.4a Proper Use

DO NOT put Liquid Nitrogen (LN2) or dry ice into a laboratory sink.

9.4b Repairs

Cracks resulting from LN2 or dry ice damage will be paid for by the lab or lab's department. Leaks should be reported immediately to the Facilities Service Desk at 402.554.3600.

10.0 Laboratory Waste

Policies and procedures regarding waste within the laboratory can be found in the UNO Waste Handling Plan.

10.1 Biohazard Waste Disposal

Biohazardous waste, also called infectious waste or biomedical waste, is any waste containing infectious materials or potentially infectious substances. If liquid this waste can be disposed to the sanitary sewer or sent to a biohazard waste disposal company. Biohazardous wastes are handled in accordance with UNO Biosafety Procedures.

10.2 Definition of Sharps

10.2a Biohazard Sharps Waste

Biohazardous sharps waste consists of discarded items such as that: 1) derived from human patient diagnosis, care, or treatment; 2) derived from infected animals whether naturally occurring or through research activities; and 3) contaminated from research laboratories not involving human or animal materials. These items include hypodermic needles, scalpels, plastic pipettes, Pasteur pipettes, pipette tips, vacutainer tubes, glass containers, or any other item which can potentially transmit disease by cutting or piercing the skin. These items are to be placed into an approved sharps container prior to disposal into the red biohazard transport vessel.

10.2b Medical/Research Sharps Waste

Medical/research sharps waste are materials, although not contaminated with a biohazardous agent and thus not considered a vehicle of disease transmission, that may be perceived as infectious when presented for disposal. These materials should be handled as biohazard sharps waste due to safety concerns about their disposal. Medical/research sharps waste include but are not limited to needles, syringes, scalpels, glass microscope slides and glass cover-slips which must be disposed in an approved sharps container, as well as pipettes and pipette tips which must be disposed in secondary containment before placement in the red biohazard transport vessel.

10.3 Disposal Information

- **Biohazard Sharps Waste** must be placed in sharps containers (Containers can be ordered from General Supply). When full the sharps containers must be placed in the red biohazardous waste containers by the generator.
- **Medical/ Research Sharps Waste** Only can be placed in sharps containers or cardboard boxes and sealed. When full the sharps containers/boxes must be placed in the red biohazardous waste containers by the generator.

Environmental Services will bring red biohazardous waste containers to the lab and will pick them up when properly tied and sealed for pick-up. Containers can be requested when needed or can be left in the lab until filled. Call the Facilities Service Desk at 402.554.3600 to request containers or container pickup.

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10.4 Recycling in the Laboratory

Information for on-campus recycling can be found on the UNO Sustainability website at: unomaha.edu/sustainability/_docs/recycling_basics_campus.pdf

For additional information about UNO sustainability efforts, visit: unomaha.edu/sustainability/office.php

11.0 Radiation Safety

The University of Nebraska Medical Center (UNMC) is a unit of the University of Nebraska system and is the health sciences training center for the state of Nebraska. UNMC and its teaching hospital, Nebraska Medicine, has gained recognition as a center of excellence for teaching, quality patient care, and research programs. Radiation is used extensively in the hospital in the treatment of patients and in UNMC research laboratories to learn more about normal body function and diseases with the goal of developing better means of treating them. The high quality of medical care that we have today would not exist without the use of radiation.

The UNMC Radiation Safety Office (RSO) oversees the use of radiation and radioactive material at UNMC and UNO, and ensures compliance with state and federal regulations to protect UNMC/UNO employees, students, the public, and the environment.

11.1 Radiation Safety Manual

The University of Nebraska Medical Center Radiation Safety Manual is a book of procedures and useful information for the radiation worker who uses either radioactive materials or radiation-producing machines in a laboratory setting at UNMC and UNO.

The manual also reflects the requirements of relevant federal and state regulations. The manual supplements but does not replace the required radiation safety training which all radiation workers must receive.

A copy of the Radiation Safety Manual can be found on-line at: unmc.edu/ehs/Manuals/RSM_2019.pdf

Your comments and suggestions concerning the Radiation Safety Manual are welcomed and can be directed via email to frutar@unmc.edu.

11.1a Notice to Employees: Standards for Protection against Radiation; Notices, Instructions and Reports to Workers; Inspections

In Title 180, Regulations for Control of Radiation, the Nebraska Department of Health and Human Services has established standards for your protection against radiation hazards and has established certain provisions for the options of workers engaged in work under a Department license or registration.

A full version of the pdf file can be found on-line at: info.unmc.edu/ehs/rsm/Notice.pdf

11.1b Resources

Additional resources are available on the Radiation Safety website at: unmc.edu/ehs/radiation-safety/index.html

Links are available on the website to access the following documents:

- Application for Radioactive Material License
- Research Using Radioactive Material in Animals
- Delegation of Authority for RSO
- Radiation Safety Office Audit Form

11.1c Training Requirements

A complete list of training requirements for Radiation Safety can be found on-line at: unmc.edu/ehs/training/radiation-safety/index.html

12.0 Biosafety

The Institutional Biosafety Committee (IBC) is dedicated to protecting the health and safety of everyone at UNMC who works with biohazardous agents. Some of our major responsibilities include:

- Reviewing and approving recombinant DNA research projects to ensure compliance with NIH guidelines
- Notifying principal investigators of the results of our reviews and approvals
- Drafting campus biosafety policies and procedures, including the creation of emergency plans in the case of accidental spills and personnel contamination
- Reporting any problems, violations, accidents or illnesses to the appropriate offices

12.1 Policies and Procedures

The IBC is committed to making the application and review process as easy as possible for you. In this section, you will find definitions, explanations, policies and procedures relating to biosafety guidelines at UNMC.

Below is a list of links to access information regarding the Biosafety policies and procedures:

- View all biosafety policies
- Review the biosafety manual
- Review the application process
- See what experiments require IBC approval
- View the export control decision tree to determine if export control analysis is needed

If you have questions or need more information, please call 402.559.6463 for assistance.

12.2 Research Resources

Research resources are available on-line at: unmc.edu/ibc/research-resources/index.html

Guidelines

- CDC/NIH Biosafety in Microbiological and Biomedical Laboratories
- CDC/NIH Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets
- Health Canada: Laboratory Biosafety Guidelines
- NIH Guidelines for Research Involving Recombinant DNA Molecules
- WHO Laboratory Biosafety Manual

Websites

American Biological Safety Association
CDC Import Permits Program
CDC Select Agent Program
Health Canada MSDS - Infectious Substances
OSHA Bloodborne Pathogen Standard (29CFR 1910.1030)
Risk Group Classification for Infectious Substances
UNMC Shipment of Hazardous Materials or Dangerous Goods Policy

13.1 Animal Care

Use and care of animals used in research at UNO is managed by the Coordinator of Animal Care. The UNO animal care animal care and use program is accredited by AAALAC International . The accreditation process provides continuing voluntary peer review of the UNO program by internationally recognized experts. UNO is registered as a research facility with the United States Department of Agriculture under the Animal Welfare Act. The care and use of animals used for research at UNO is based on national guidelines and Federal Regulations including:

- The U.S. Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research and Training.
- The USDA implementing regulations, 9CFR, of the Animal Welfare Act.
- U.S. Public Health Service Policy for the Humane Care and Use of Laboratory Animals negotiated with the Office of Laboratory Animal Welfare, OLAW.
- The Guide for the Care and Use of Laboratory Animals, and the UNMC/UNO IACUC Guidelines and Policies for the Care and Use of Live Vertebrate Animals.

13.1 Regulations, Policies & Guidelines

Regulations and guidelines for animal care and use followed at UNMC include:

1. The USDA Animal Welfare Act and other Federal Legislation
2. The US Public Health Service Policy on Humane Care and Use of Laboratory Animals
3. The Guide for the Care and Use of Laboratory Animals, Eighth Edition (NAP)
4. AAALAC International rules for accreditation.
5. The UNMC/UNO IACUC Guidelines and Policies for the Care and Use of Live Vertebrate Animals
6. Other applicable state regulations

13.1a UNMC Comparative Medicine Standard Operation Procedures

Anesthesia and Analgesia
Drug Dosages for Sedation, Anesthesia and Analgesia
Recognizing the Potential Causes, Intensity and Clinical Signs of Pain
Rodent Blood Collection
Rodent Gender Determination
Rodent Genotyping Techniques
Rodent Identification Techniques
Rodent Injection Techniques

13.2 Services & Training

A professional staff of specialty trained veterinarians, animal care managers, technicians and husbandry personnel provide care for animals used in the UNO research program.

Contact the Coordinator of Animal Care with any questions, at 402.554.2943 or swomack@unomaha.edu

14.0 Not used

15.0 Laboratory Safety Inspections

All laboratories are inspected on an annual basis by UNO Environmental Health and Safety to ensure compliance with federal, state and university requirements. Inspections may also be periodically unannounced as they relate to a reported incident or when potential unsafe laboratory practices are reported.

If you have any questions regarding lab inspections, or need to report any unsafe lab practices please contact EHS at 402.554.3596.

15.1 Focus and Function

As we all play an important role in research on campus, it is required that each lab be inspected according to policy. Based on the research being conducted in your lab, you are subject to various lab audits/inspections at any time.

15.1a Environmental Health and Safety

The purpose of annual lab inspections is to ensure all labs are following the appropriate lab safety policies and procedures within their research labs. Lab safety inspections are conducted on an annual basis and scheduled by EHS. This inspection covers the general practices of lab safety to meet OSHA requirements, as well as the chemical safety audit of each lab to meet EPA requirements.

The EPA RCRA Compliance Audit program has evolved from the efforts of the Associate General Counsel and Director of Institutional Compliance for the University of Nebraska. The primary objective of the EPA RCRA Compliance Audit is to provide EPA regulatory guidance to UNO personnel, and has been designed to accomplish the following goals:

1. Ensure that all labs/chemical use areas are in compliance with EPA RCRA and OSHA regulations.
2. Visit labs handling materials in order to gather information on the generation of hazardous waste and subsequent disposal.
3. To promote waste minimization and pollution prevention.
4. Help UNO personnel become familiar with EPA and OSHA regulatory compliance inspection interviews.

The laboratory inspection process at UNO should be viewed as a positive management tool which provides the user and UNO with an opportunity to assess environmental impacts and correct any potential problems prior to a regulatory inspection.

15.1b Biosafety Inspections

A laboratory inspection is performed to comply with regulations contained in the NIH Guidelines for Research. This inspection is designed to ensure that laboratory standards are followed according to the Guidelines and to provide technical advice to principal investigators and other laboratory scientists on research safety and biosecurity issues. All BSL-2 and ABSL-2 research laboratories on campus will undergo a Biosafety Inspection at the time of setting up a new IBC protocol. As a part of an on-going audit, these laboratories will also undergo a Biosafety Inspection every three years while the IBC protocol remains active. All BSL-3 and ABSL-3 research laboratories will undergo a Biosafety Inspection at the time of setting up a new IBC protocol with annual inspection while the IBC protocol remains active. For more information regarding Biosafety guidelines and inspections, contact Jenna Mckenzie, Ph.D. at 402.836.9349.

The purpose of BSL-3 and ABSL-3 research lab inspections is to ensure all labs are following the appropriate lab safety policies and procedures within their research labs. Each lab will be contacted to schedule an annual inspection.

15.1c Radiation Safety Inspections

To use radioactive material at UNO a researcher must be issued a radioactive material license by the UNMC Environmental Health and Safety office. The Radioactive Material License indicates types and amounts of radionuclides to be used, how it is to be used, and locations of use. All uses of radioactive material must follow the UNMC Radiation Safety Manual. A Radioactive Material License may be subject to an audit by EHS personnel at any time. The purpose of any audit is to ensure the safe and compliant use of radioactive material and identifying any problem areas which can be corrected. These audits are intended to model State inspections so that the researchers are better prepared for an audit by the State regulatory agency (Nebraska Office of Radiological Health).

There are two types of audits performed; a standard audit and a performance-based audit. In the Standard Audit both the facility/equipment and required documentation are reviewed for regulatory compliance. In addition, items of noncompliance previously identified are reviewed so that they are not repeated. Items of non-compliance identified in the audit are reported to the UNMC Radiation Safety Committee (RSC) at its next quarterly meeting. The researcher is typically contacted to schedule a convenient time to conduct the audit, although unannounced audits may be performed.

At a minimum, the EHS office will perform these audits when renewing a license (usually every two years), but in most cases a standard audit is performed annually. These audits may also be performed at the discretion of EHS, RSC, or at the request of the researcher. At a minimum, the EHS will perform performance audits during license renewal (at least every 2 years) but can be performed at the discretion of EHS, Radiation Safety Committee, or researcher. For more information, contact the EHS Office at 402.559.6356.

15.2 Hazard Tracking System (Not currently in use)

16.0 Lab Building Modifications and Facilities Projects

All requests for major or minor structural changes, including modifications in Research Buildings must be approved, in advance, and completed by an approved, licensed individual within or under direction of Facilities Management.

16.1 Lab Review Project Policy

Laboratory and Office Structural Modification Policy:

All requests for major or minor structural changes in University Buildings must be approved in advance, including modifications to the interior design, including but not limited to laboratory casework or counter tops, plumbing, electrical, lighting, elevators, controls, flooring, and wall hangings, and completed by an approved, licensed individual within or under direction of Facilities Management.

Process: Submit all requests for space modification to Facilities Management and Planning at unomaha.edu/facilities-management-and-planning/index.php

Specific requirements (including timing, cost estimates, etc.) are found at that link.