LABORATORY SAFETY MANUAL

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University of Nebraska Medical Center

UNMC
BREAKTHROUGHS FOR LIFE.

Table of Contents

9.0 Laboratory Engineering Controls

- 9.1 Fume Hood & Biosafety Cabinet Manual
- 9.2 Laboratory Ventilation Systems
- 9.3 Fume Hood Control Operations for DRCI and II
  - 9.3a Normal Operation
  - 9.3b Alarm Mode/Purge Mode 9.3c Emergency Purge Mode
- 9.4 Plumbing Systems
  - 9.4a Proper Use
  - 9.4b Repairs

10.0 Laboratory Waste

- 10.1 Biohazard Waste
- 10.2 Definition of Sharps
  - 10.2a Sharps
  - 10.2b Non-Sharps
- 10.3 Disposal of Glassware
- 10.4 Chemical Waste
- 10.5 Recycling in the Lab

11.0 Radiation Safety

- 11.1 Radiation Safety Manual 11.1a Notice to Employees 11.1b Resources
  - 11.1c Training Requirements

12.0 Biosafety

- 12.1 Policies and Procedures
- 12.2 Research Resources

13.0 Comparative Medicine

- 13.1 Regulations, Policies & Guidelines
- 13.2 Services & Training

14.0 Research Information Technology Office

15.0 Laboratory Safety Audits

- 15.1 Focus and Function
  - 15.1a Environmental Health and Safety 15.1b Biosafety
  - 15.1c Radiation Safety
- 15.2 Hazard Tracking System

16.0 Lab Building Modifications and Facilities Projects

- 16.1 Lab Review Project Policy
- 16.2 Lab Close Out Policy
- 16.3 Lab Close Out Checklist

17.0 Chemical Safety

- 17.1 Hazardous Material Fact Sheets
- 17.2 UNMC Chemical Hygiene Plan

On-Campus Emergency Telephone Numbers

Biohazardous Spill	(402) 559-5555
Biosafety Officer *for after business hours:	(402) 559-7774 *Pager (402) 888-3504
Building Utilities, Repair & Maintenance (Facilities Help Desk)	(402) 559-4050
Cardiac Arrests	(402) 559-5555 ("911" off campus)
Chemical Spills & Exposures	(402) 559-5555
Chemical Waste Pick-up	(402) 559-6356
Compliance Hotline	1-866-568-5430
Emergencies	(402) 559-5555 ("911" off campus)
Employee Health	(402) 552-3563
Environmental Health and Safety (EHS)	(402) 559-6356
Environmental Services (EVS)	(402) 559-4073
Fire	(402) 559-5555 ("911" off campus)
Fume Hood/ Biological Safety Cabinet Issues	(402) 559-4050
Gas Odors/Leaks	(402) 559-5555
Healthcare Epidemiology/Infection Control	(402) 559-5276
Information Security Incidents	(402) 559-7700
Laboratory Sign Updates	(402) 559-9913
Medical Emergencies	(402) 559-5555 ("911" off campus)
Needle Sticks/Body Fluid Exposures	OUCH PAGER (402) 888-6824
Odor Complaints	(402) 559-4050
Poison Control Center	(402) 955-5555 or 1-800-222-1222
Radiation Safety	(402) 559-6356
Radioactive Spills	(402) 559-6356 *(402)559-5555 *after business hours*
Research Resources Manager	(402) 559-3231
Security Business Office	(402) 559-4439
Security Dispatch	(402) 559-5111

Mission

WE ARE NEBRASKA MEDICINE & UNMC

Our mission is to lead the world in transforming lives to create a healthy future for all individuals and communities through premier educational programs, innovative research and extraordinary patient care.

Vision

UNMC, with its hospital partner, Nebraska Medicine and other clinical partners, will provide a world-renowned health sciences center that:

- Delivers state-of-the-art health care;
- Prepares the best-educated health professionals and scientists;
- Ranks among the leading research centers;
- Advances our historic commitment to community health;
- Embraces the richness of diversity to build unity; and
- Creates economic growth in Nebraska.

Introduction

The University of Nebraska Medical Center Environmental Health and Safety department has developed this manual to assist in the recognition, evaluation, and control of chemical and physical hazards associated with University laboratory operations. 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 UNMC laboratories. With the diverse nature of work being conducted in UNMC 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) 559-6356.

For additional information, please check the resources below.

Environmental Health and Safety: http://www.unmc.edu/ehs/

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

Comparative Medicine: https://info.unmc.edu/comparativemed/about/index.html

IACUC: http://www.unmc.edu/iacuc/

UNMC IRB: http://www.unmc.edu/irb/

1.1 Assignment of Responsibility

It is the responsibility of all staff, students, and faculty of UNMC to read, understand and comply with the UNMC Safety Policies, Plans and Guidelines. Everyone is responsible to take precaution to protect the safety of other workers and himself/herself.

1.2 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

1.3 Research Department

The Research Department shall be responsible for supporting the PI and research staff with all resources necessary to ensure safety compliance. This will include providing training to PI and staff members and allowing for time away from work for training.

1.4 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.

1.5 The University of Nebraska Medical Center (UNMC)

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

1.6 UNMC Environmental Health & Safety (EHS)

UNMC 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 inspections.

2.0 Emergency Procedures

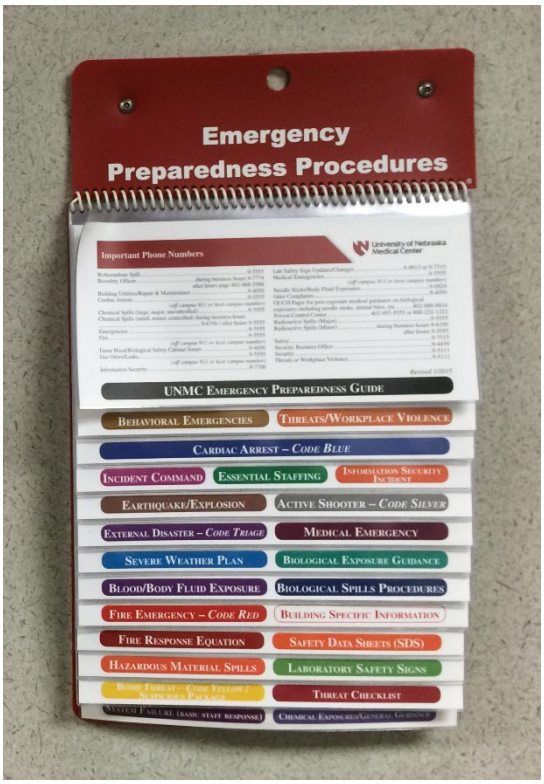
Employees and students should know escape routes and be able to locate the emergency exits from the area in which they work. Never use an elevator as part of your escape route. Learn where the fire alarm pull stations and fire extinguishers are in your work area. By knowing the location of these items,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

Individuals should report all emergencies to Campus Security by calling (402) 559-5555.

2.1 Emergency Preparedness Flipcharts

UNMC 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.

The Emergency Preparedness Procedures flipchart can also be found on-line at: https://info.unmc.edu/safety/safety-office/policies-resources/emergprepguide.pdf



3.0 Hazard Assessments in Research Laboratory

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 Global Harmonization System (GHS)

The United States is currently participating in the Global Harmonization System (GHS) of Classifying and Labeling Chemicals. 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

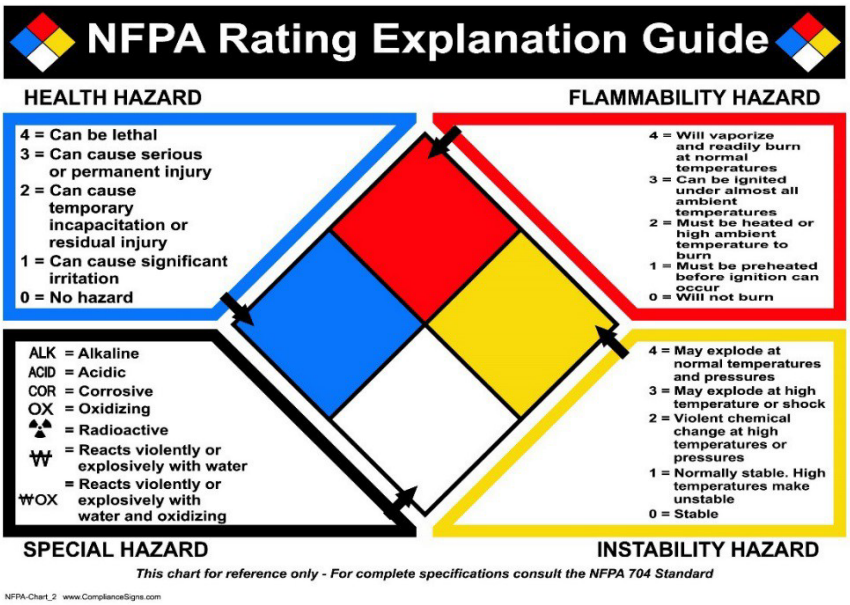
- The NFPA 704M labels are diamond-shaped, and is divided into four parts, or quadrants.

- 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 a 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 utilized.

3.4a Sample of Safety Data Sheet

SIGMA-ALDRICH sigma-aldrich.com

SAFETY DATA SHEET
Version 4.7
Revision Date 11/24/2014
Print Date 11/26/2014

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Acetonitrile

Product Number : 271004
Brand : Sigma-Aldrich
Index-No. : 608-001-00-3

CAS-No. : 75-05-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Acute toxicity, Dermal (Category 4), H312
Eye irritation (Category 2A), H319

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H225 Highly flammable liquid and vapour.
H302 + H312 + H332 Harmful if swallowed, in contact with skin or if inhaled
H319 Causes serious eye irritation.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ eye protection/ face protection.
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P363 Wash contaminated clothing before reuse.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235 Store in a well-ventilated place. Keep cool.
P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms : Methyl cyanide
ACN

Formula : C_2H_3N
Molecular weight : 41.05 g/mol
CAS-No. : 75-05-8
EC-No. : 200-835-2
Index-No. : 608-001-00-3
Registration number : 01-2119471307-38-XXXX

Hazardous components

Component	Classification	Concentration
Acetonitrile		
	Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2A; H225, H302 + H312 + H332, H319	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

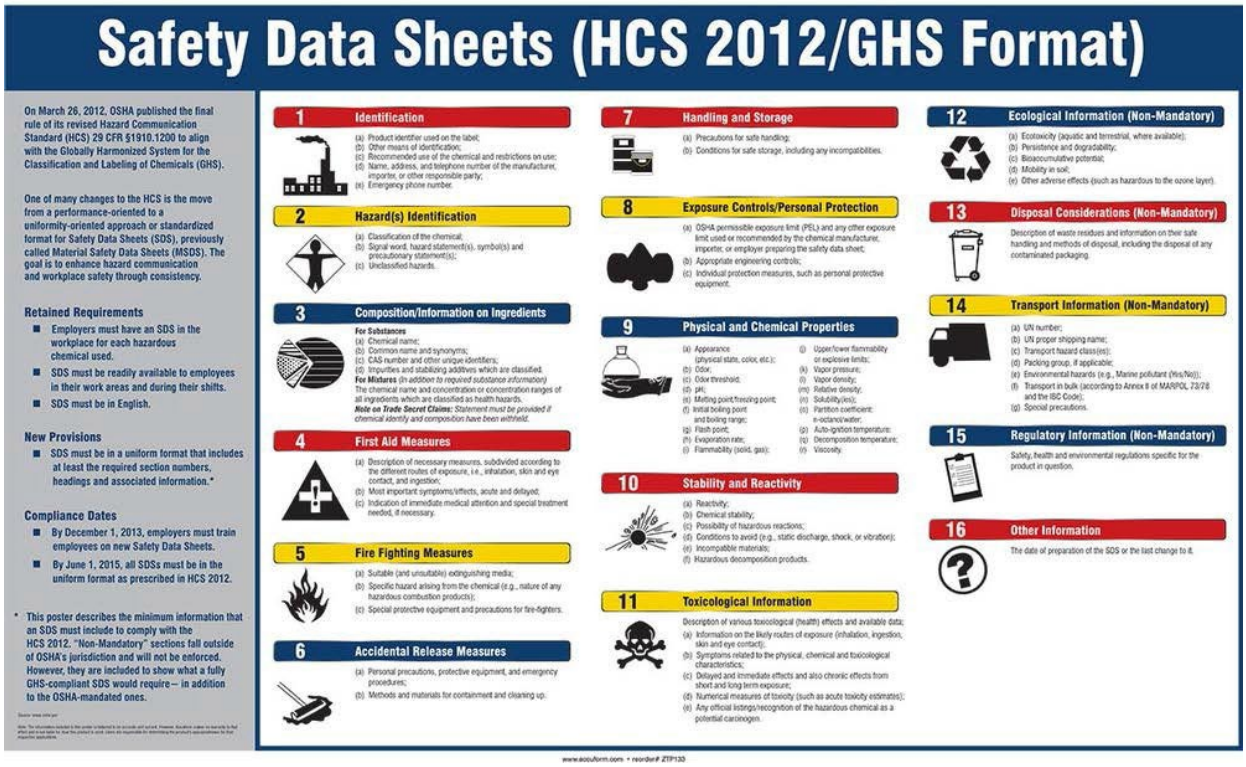
In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

3.5 How to Read: Safety Data Sheets

The information listed below is a publication by OSHA and can be found on-line at: https://www.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 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

Below is a link to the on-line SDS binder for materials used on campus. UNMC and Nebraska Medicine's electronic binder lists over 10,000 safety data sheets. In addition to the electronic binder for UNMC and Nebraska Medicine, the MSDSonline system also feature the ability to search an electronic database of over 400,000 safety data sheets.

You can search the database in several ways, by name, manufacturer, etc. If you do not the chemical you are searching for in our binder, you can search the entire SDS online database and request that he chemical be added to our binder.

3.7 Exposure Monitoring

If you are using any of the chemicals listed below, EHS can help in conducting a risk assessment to determine if exposure monitoring is necessary in the laboratory. For more information on exposure monitoring in the laboratory, please contact EHS at (402) 559-6356.

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-Naphthlamine
beta-Propiolacetone
bis-Chloromethyl ether
BTEX + Saturated Hydrocarbons
Cadmium
Chromium VI
Collodion
Dichloromethane
Ethyl Alcohol
Ethylene oxide
Ethyleneimine
Formaldehyde
Formalin
Glutaraldehyde
Halogenated Anesthetics
(Desflurane, Isoflurane, Halothane,
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

A copy of the Emergency Procedures guide can be found on-line at: https://info.unmc.edu/safety/safety-office/policies-resources/emergprepguide.pdf

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?) It's 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 UNMC Researchers. Please search for catalog# 17-111-228 in eShop.

This 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.

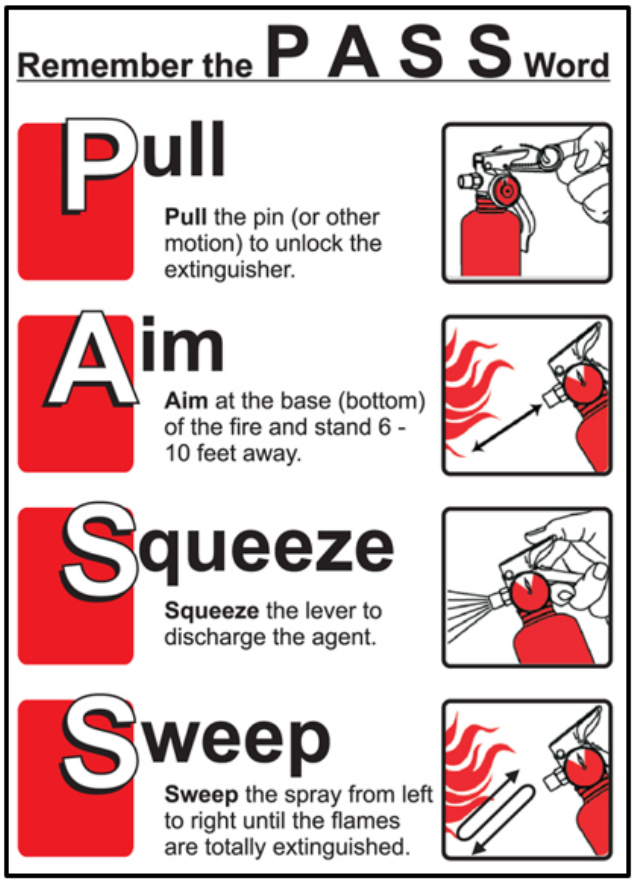
If you need assistance in selecting the appropriate chemical spill kit for your area, please contact EHS at (402) 559-6356.

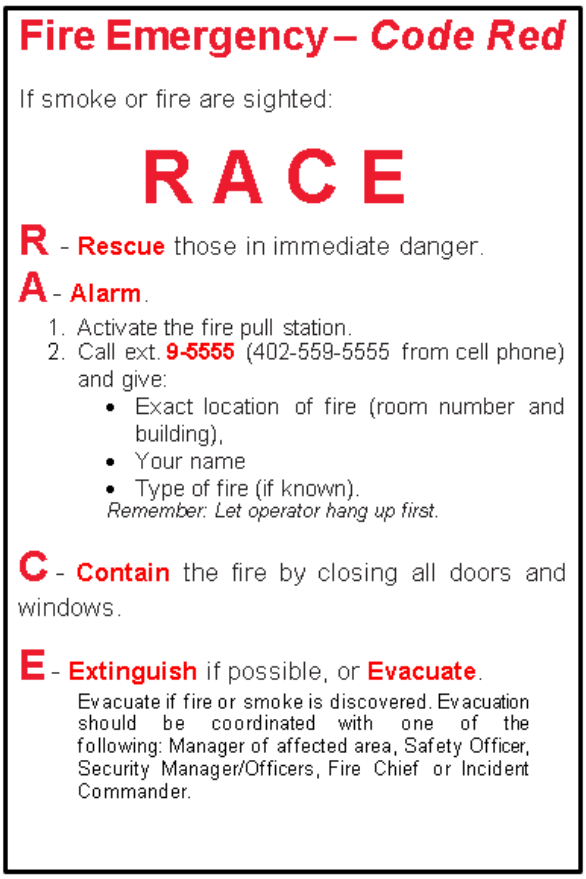
REPORT ALL CHEMICAL SPILLS.
CONTACT CAMPUS SECURITY
AT (402) 559-5555.

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 always exits.

All fires must be reported immediately, both active fires and those that have been extinguished. Report all fires to Campus Security at (402) 559-5555. Everyone must follow the directions given over the fire alarm system and house paging system and/or in person by Campus Security, Omaha Fire Department or Omaha Police Department. Failure to follow the directions to evacuate may result in disciplinary action.





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 meet appropriate standards and regulations. The annual inspection is conducted by the UNMC Facilities Management department.

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

4.5 a 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 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.

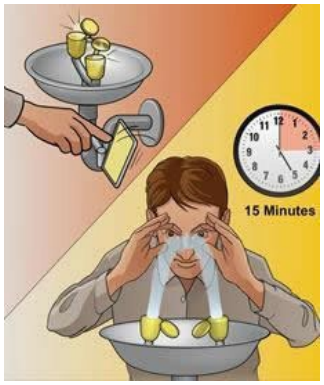
Wall mounted units, or units in public access areas, are tested on an annual basis only.

Additional information on eye wash and safety shower inspections can be found here: https://www.unmc.edu/ehs/safety/lab-safety/EyeWashSafetyShowerInspections.pdf

4.6a Using an Eyewash Station

If a chemical splashes 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 hazard 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.

UNMC requires all laboratory staff to follow the Occupation 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 is 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.

UNMC Laboratory PPE Selection Guide

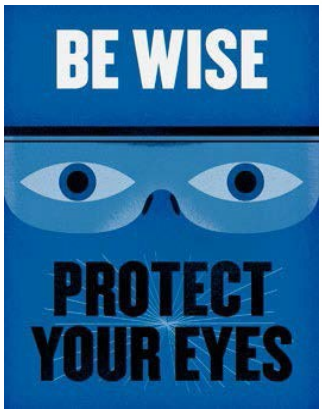
Lab Coat: Lab coats are worn in the research laboratory to protect your normal clothing against biological or chemical spills and to provide some additional body protection beyond that provided by your normal clothing. Lab coats should fit properly, be clean, have long sleeves and be current with the UNMC brand. Individuals working with flammable chemicals should purchase a flame-resistant lab coat, thru Fisher Scientific or another vendor in eShop. For assistance in selecting the appropriate lab coat, contact EHS at (402) 559-6356.

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 laboratory setting with potential hazards. Contact lense users who need to wear contact lenses in the laboratory, must wear impact resistant chemical goggles. It is important to consider the additional potential risk that your contact lenses may present if dust, caustic reagents or solvents get underneath your lenses 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: the use of powdered latex gloves is prohibited, as stated in UNMC Policy No. 2003, Latex Sensitivity.

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: http://www.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 an appointment with Employee Health, please call (402) 552-3563.

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.

Contact Environmental Health and Safety at (402) 559-6356 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

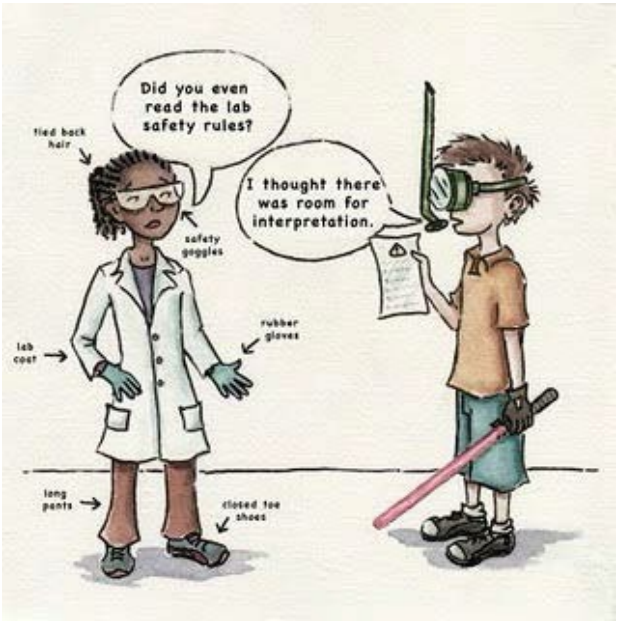
A hazard assessment should be completed by the Principal Investigator (PI) or the laboratory manger or supervisor to determine what PPE is necessary for personnel working within the laboratory. All personal protective equipment issued must meet American National Standards Institute (ANSI) standards.

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 employees/students at UNMC, working in the research laboratories. Labs can use the PPE Training & Issuance Record form to record this information.

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 clothing 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) 559-4050.

"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.

Non-Compliant Cold Room

Compliant Cold Room

Photos taken during the 2015 safety inspection of cold rooms

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 wear their employee ID badge when working on campus. Do not allow access to halls or floors (via elevators or stair tower doors) to anybody that does not have their own personal ID badge that allows them access restricted areas.

Do not hesitate to politely question anyone whom you do not recognize or you believe does not belong in the area. If there is any concern about lab security or suspicious individuals, please contact Campus Security at (402) 559-5111.

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

UNMC 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, UNMC Policy No. 2007: http://wiki.unmc.edu/Children_in_the_Workplace

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 UNMC provides functions or services.
Please refer to the Pets in the Workplace Policy, UNMC Policy No. 2008: http://wiki.unmc.edu/Pets_in_the_Workplace

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). Food and drinks must be covered prior to transporting through an area where a hazardous material is used or stored.

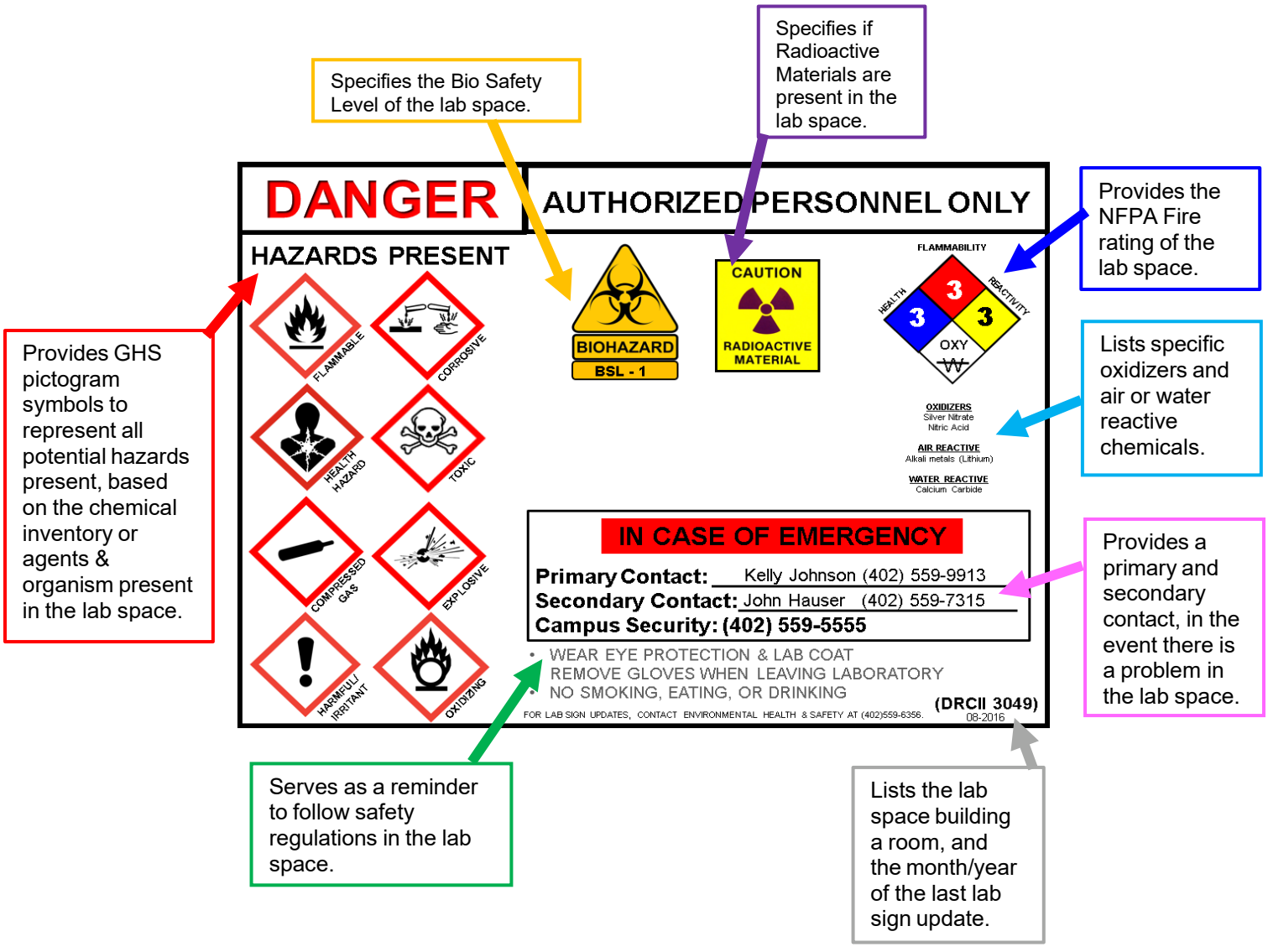
Hands should be washed after removing gloves and prior to handling food, drinks, contact lenses, applying cosmetics or any other hand to face activities. Food and drinks may be placed in the corridor outside the lab if doing so does not violate fire codes and the container is covered.

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.

UNMC 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 at each corridor door leading into the workspace.

What does a lab sign consist of?



6.1 Laboratory Sign Worksheet/Chemical Inventory

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

To request a lab sign, please complete the Laboratory Sign Worksheet. The Lab Safety Sign Worksheet is an Adobe Acrobat PDF Fillable form. **Mac user please do not fill out form in preview mode or the field will not be visible when you send it.*

On page 2 of the worksheet, you will be required to submit a chemical inventory. For additional information, please visit the Chemical Inventories web page.

Please note: When completing the laboratory sign worksheet, the primary and secondary contacts listed should be knowledgeable about the contents of the laboratory room/space. Emergency response personnel may ask that we contact individuals listed on lab signs for more specific information during emergencies.

It is understood that some research facilities on campus contain areas that will be shared by more than one researcher. A lab sign worksheet should be submitted by each researcher using a shared room, or one combined worksheet with information of all individuals who are sharing the room. When there is more than one worksheet and chemical inventory submitted for the shared area, the information will be combined to develop a single sign which reflects all the hazards.

Once the worksheet is completed it should be returned to the EHS Office. One worksheet will need to be completed for each laboratory room/space. It is recommended that you rename the file when you save it and keep a copy as a backup before submitting a copy to EHS, Zip 5480 or via email to EHS.

6.2 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 Security Dispatch, 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.

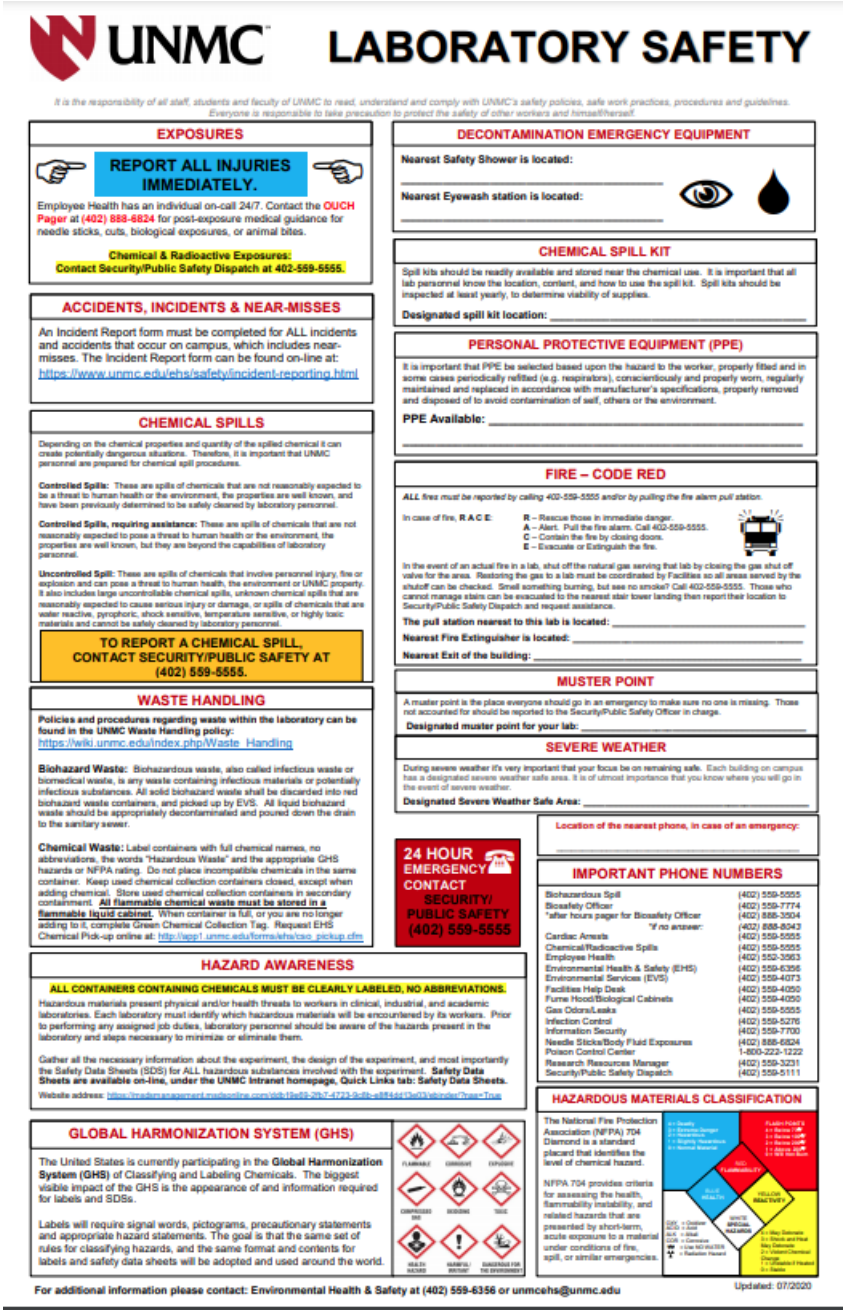
Emergency contacts will be called in the order listed on your submitted form. It is recommended that the laboratory Principal Investigator (PI) be the first point of contact.

6.3 Laboratory Safety Poster

Laboratory safety posters are distributed by EHS. 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 summary of laboratory safety procedures, chemical spill information, important phone numbers, and emergency preparedness information.

Additional lab safety related posters are also available to print and post in your area. These can be found in the Lab Safety Posters tab on the Lab Safety Resources web page.



UNMC LABORATORY SAFETY

It is the responsibility of all staff, students and faculty of UNMC to read, understand and comply with UNMC'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.

EXPOSURES

REPORT ALL INJURIES IMMEDIATELY.

Employee Health has an individual on-call 24/7. Contact the OUCH Pager at (402) 888-6824 for post-exposure medical guidance for needle sticks, cuts, biological exposures, or animal bites.

Chemical & Radioactive Exposures: Contact Security/Public Safety Dispatch at 402-559-5555.

ACCIDENTS, INCIDENTS & NEAR-MISSES

An Incident Report form must be completed for ALL incidents and accidents that occur on campus, which includes near-misses. The Incident Report form can be found on-line at: https://www.unmc.edu/ehs/safety/incident-reporting.html

CHEMICAL SPILLS

Depending on the chemical properties and quantity of the spilled chemical it can create potentially dangerous situations. Therefore, it is important that UNMC personnel are prepared for chemical spill procedures.

Controlled Spills: These are spills of chemicals that are not reasonably expected to be a threat to human health or the environment, the properties are well known, and have been previously determined to be safely cleaned by laboratory personnel.

Controlled Spills, requiring assistance: These are spills of chemicals that are not reasonably expected to pose a threat to human health or the environment, the properties are well known, but they are beyond the capabilities of laboratory personnel.

Uncontrolled Spill: These are spills of chemicals that involve personnel injury, fire or explosion and can pose a threat to human health, the environment or UNMC property. It also includes large uncontrollable chemical spills, unknown chemical spills that are reasonably expected to cause serious injury or damage, or spills of chemicals that are water reactive, pyrophoric, shock sensitive, temperature sensitive, or highly toxic materials and cannot be safely cleaned by laboratory personnel.

TO REPORT A CHEMICAL SPILL, CONTACT SECURITY/PUBLIC SAFETY AT (402) 559-5555.

WASTE HANDLING

Policies and procedures regarding waste within the laboratory can be found in the UNMC Waste Handling policy: https://wiki.unmc.edu/index.php/Waste_Handling

Biohazard Waste: Biohazardous waste, also called infectious waste or biomedical waste, is any waste containing infectious materials or potentially infectious substances. All solid biohazard waste shall be discarded into red biohazard waste containers, and picked up by EVS. All liquid biohazard waste should be appropriately decontaminated and poured down the drain to the sanitary sewer.

Chemical Waste: Label containers with full chemical names, no abbreviations. the words "Hazardous Waste" and the appropriate GHS hazards or NFPA rating. Do not place incompatible chemicals in the same container. Keep used chemical collection containers closed, except when adding chemical. Store used chemical collection containers in secondary containment. **All flammable chemical waste must be stored in a flammable liquid cabinet.** When container is full, or you are no longer adding to it, complete Green Chemical Collection Tag. Request EHS Chemical Pick-up online at: http://app1.unmc.edu/forms/ehs/cso_pickup.cfm

DECONTAMINATION EMERGENCY EQUIPMENT

Nearest Safety Shower is located: _____

Nearest Eyewash station is located: _____

CHEMICAL SPILL KIT

Spill kits should be readily available and stored near the chemical use. It is important that all lab personnel know the location, content, and how to use the spill kit. Spill kits should be inspected at least yearly, to determine viability of supplies.

Designated spill kit location: _____

PERSONAL PROTECTIVE EQUIPMENT (PPE)

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.

PPE Available: _____

FIRE – CODE RED

ALL fires must be reported by calling 402-559-5555 and/or by pulling the fire alarm pull station.

In case of fire, **R.A.C.E**:
R – Rescue those in immediate danger.
A – Alert. Pull the fire alarm. Call 402-559-5555.
C – Contain the fire by closing doors.
E – Evacuate or Extinguish the fire.

In the event of an actual fire in a lab, shut off the natural gas serving that lab by closing the gas shut off valve for the area. Restoring the gas to a lab must be coordinated by Facilities so all areas served by the shutoff can be checked. Smell something burning, but see no smoke? Call 402-559-5555. Those who cannot manage stairs can be evacuated to the nearest stair tower landing then report their location to Security/Public Safety Dispatch and request assistance.

The pull station nearest to this lab is located: _____

Nearest Fire Extinguisher is located: _____

Nearest Exit of the building: _____

MUSTER POINT

A muster point is the place everyone should go in an emergency to make sure no one is missing. Those not accounted for should be reported to the Security/Public Safety Officer in charge.

Designated muster point for your lab: _____

SEVERE WEATHER

During severe weather it's very important that your focus be on remaining safe. Each building on campus has a designated severe weather safe area. It is of utmost importance that you know where you will go in the event of severe weather.

Designated Severe Weather Safe Area: _____

Location of the nearest phone, in case of an emergency: _____

24 HOUR EMERGENCY CONTACT SECURITY/ PUBLIC SAFETY (402) 559-5555

IMPORTANT PHONE NUMBERS

Biohazardous Spill	(402) 559-5555
Biosafety Officer	(402) 559-7774
*after hours pager for Biosafety Officer	(402) 888-3504
*if no answer:	(402) 888-8043
Cardiac Arrests	(402) 559-5555
Chemical/Radioactive Spills	(402) 559-5555
Employee Health	(402) 552-3563
Environmental Health & Safety (EHS)	(402) 559-6356
Environmental Services (EVS)	(402) 559-4073
Facilities Help Desk	(402) 559-4050
Fume Hood/Biological Cabinets	(402) 559-4050
Gas Odors/Leaks	(402) 559-5555
Infection Control	(402) 559-5276
Information Security	(402) 559-7700
Needle Sticks/Body Fluid Exposures	(402) 888-6824
Poison Control Center	1-800-222-1222
Research Resources Manager	(402) 559-3231
Security/Public Safety Dispatch	(402) 559-5111

HAZARD AWARENESS

ALL CONTAINERS CONTAINING CHEMICALS MUST BE CLEARLY LABELED, NO ABBREVIATIONS.

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. Prior to performing any assigned job duties, laboratory personnel should be aware of the hazards present in the laboratory and steps necessary to minimize or eliminate them.

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. **Safety Data Sheets are available on-line, under the UNMC Intranet homepage, Quick Links tab: Safety Data Sheets.**

Website address: https://hmdsmanagement.msdsonline.com/vtdc18e88-2fb7-4723-9d8b-e8f44d13e03/vtdc/index?new=True

GLOBAL HARMONIZATION SYSTEM (GHS)

The United States is currently participating in the **Global Harmonization System (GHS)** of Classifying and Labeling Chemicals. 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.

HAZARDOUS MATERIALS CLASSIFICATION

The National Fire Protection Association (NFPA) 704 Diamond is a standard placard that identifies the level of chemical hazard.

NFPA 704 provides criteria for assessing the health, flammability instability, and related hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies.

For additional information please contact: Environmental Health & Safety at (402) 559-6356 or unmcehs@unmc.edu

Updated: 07/2020

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 the Environmental Health and Safety & Vice Chancellor for Research offices, Principal Investigator (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 UNMC 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) 559-6356.

7.2 Chemical Safety Training

The Environmental Health and Safety Office has developed a comprehensive training program, which provides specific skills and knowledge to employees who handle hazardous and radioactive material. These programs ensure that UNMC 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.

Training requirements can be found on-line at: Chemical Safety Training

7.3 Radiation Safety Training

The State of Nebraska regulations and conditions of the UNMC radioactive material license 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

General biosafety training is required by all individuals conducting research on the UNMC/UNO campuses that involve biohazardous materials. The NIH Guidelines state it is the responsibility of the institution "to ensure appropriate training for principal investigators and laboratory staff regarding safety and implementation of the NIH Guidelines" (Section IV-B-1-h). Documentation of successful completion of training is required in order to receive an IBC approval, whether involved with a new application or for a re-application. After the initial training, General Biosafety is valid for 3 years. BSL-3 and Select Agent is valid for 1 year. Contact Peter Iwen at 402-559-7774 or by email for more information about the biosafety training program.

7.5 Research Animals – Comparative Medicine Training

Animal Use and Facility Access Requirements must be completed prior to entering animal facilities or having contact with research animals at UNMC. Please note that some requirements may require periodic renewal. You will be notified when/if renewal is required. If you have any questions regarding Comparative Medicine's Research Animal training, please contact Mimi McCann at (402) 559-8395.

- *Personnel must complete the IACUC Basics course and all Occupational Health and Safety Requirements before they can be added to an IACUC protocol.*
- *Personnel must complete ALL training prior to entering an animal facility and/ or having contact with any associated research animals.*

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 detail 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 matter 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.

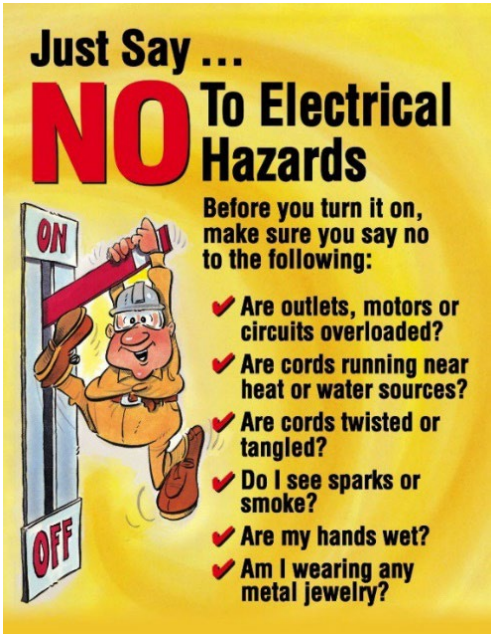
- All equipment that is used to store and/or work with biohazardous agents (i.e. centrifuges, refrigerator, incubator, etc.) shall be labeled with a biohazard sticker.
- Refrigerators/freezers shall be labeled with the "Non Explosion Proof" sticker.
- Microwave ovens and ice machines shall be labeled 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 (402) 559-4050 for assistance.



8.1a Space Heaters

Portable space heaters are prohibited from use on campus. Approval of supplemental heating will be made on a case by case basis, if HVAC systems cannot meet the temperature ranges outlined in The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 55, Thermal Environmental Conditions for Human Occupancy.

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 place 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

If your building has chilled water lines to accommodate ultralow freezers with water- cooled compressors you MUST purchase a water-cooled ultralow.

Water-cooled Ultra Low Freezer
video: https://www.youtube.com/watch?v=BTWtNiTq2zg

8.2c Equipment Alarm System

UNMC provides an alarm system for ultralow freezers on campus. Each laboratory should complete the Campus Equipment Alarm form. Please email insight@unmc.edu for additional information.

When forms are submitted, all designated lab personnel contacts will be entered into the system in the order listed on the submitted form and contacted in the same order. Please note that the alarm notification will continue to be sent until someone enters the ID and password acknowledging the alarm. Individuals will be prompted to enter the ID and password as part of the alarm message. If the freezer temperature returns to normal, a notification indicating the alarm has ended will be sent. An emergency plan to relocate product, in case of failure, should be in place and implemented by lab personnel as soon as the alarm occurs, if warranted.

Forms should be reviewed by each lab on an annual basis, to ensure the contact information is listed is accurate and current. Laboratories should also update their forms anytime there is a change in lab personnel or phone numbers.

A copy of your form shall also be placed on your alarmed freezer. This service is free of charge for UNMC departments.

If you have any questions regarding the alarm system for ultralow freezers, please contact Julie Sommer, Research Resources Manager, at 559-3231 or via email: julie.sommer@unmc.edu

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.

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 (centralized or single pump) are often used to help filter and collect liquid waste in research laboratories. It is critical that all vacuum systems are protected from potentially harmful biologicals, chemicals, and toxins.

According to the OSHA bloodborne pathogen standard, “Vacuum lines shall be protected with liquid disinfectant traps and high-efficiency particulate air (HEPA) filters of equivalent or superior efficiency, and which are checked routinely and maintained or replaced as necessary.” The BMBL (Biosafety in Microbiological Laboratories), 5th Edition, addresses vacuum line protection when working in a Class II Biosafety Cabinet with biohazardous material, “Aspirator bottles or suction flasks should be connected to an overflow collection flask containing appropriate disinfectant, and to an in-line HEPA or equivalent filter.”

Reference Vacuum Systems Safety Guideline for additional information on safe practices and procedures.

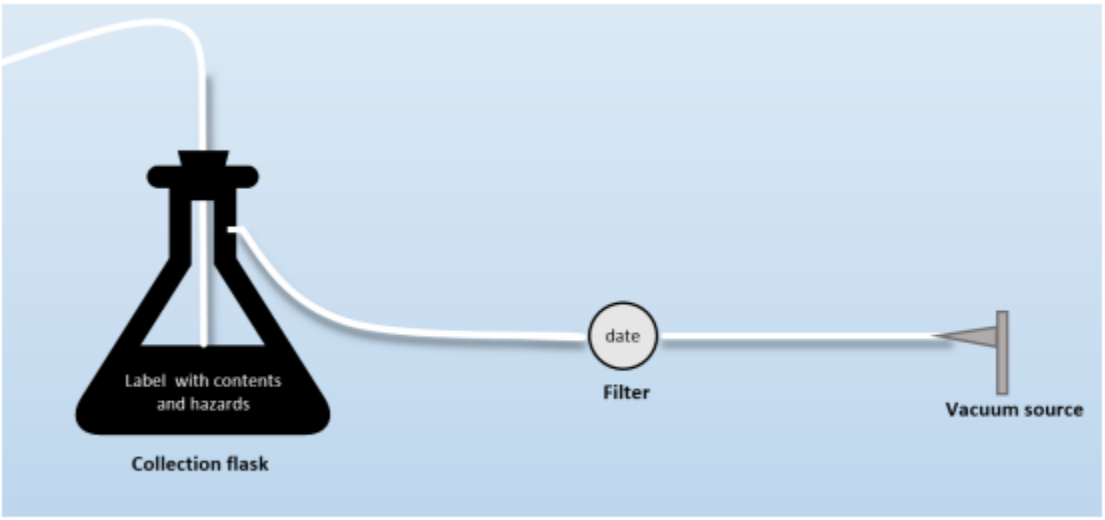


Figure 1: Line set-up (Shown outside of secondary containment for illustration purposes)

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,

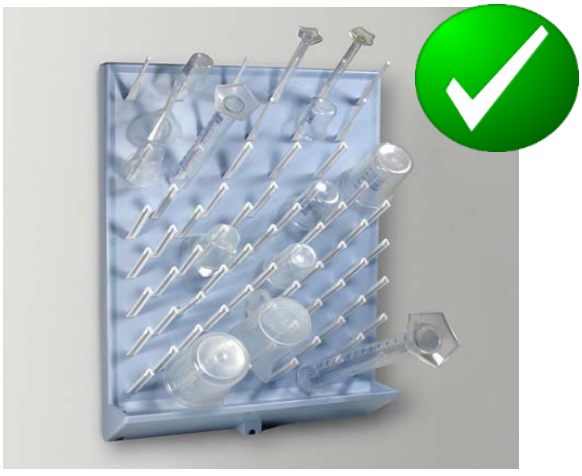
ensure that the glassware can withhold these types of changes. Always inspect glassware for flaws before you begin working with it. If defects are discovered, the item should be removed from service. Scratches in glass can grow into cracks later on. Dispose of flawed glassware if repairs are not possible.

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. *Please see section 10.4 of this manual for proper disposal of glassware.*

8.5a 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



8.5b 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)

8.6 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 an heating devices.

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 Hot Plates

Hot plates are frequently used in the laboratory to perform chemical reactions, to heat samples, and for numerous other activities. Hot plates 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 hot plates and important safety factors that users should be aware of.

Laboratory hot plates are normally used when solutions must be heated above 100 degrees Celsius. Hot plates should be designed specifically for laboratory use. Household type units should never be used in the laboratory. Hot plates 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. Utilizing 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

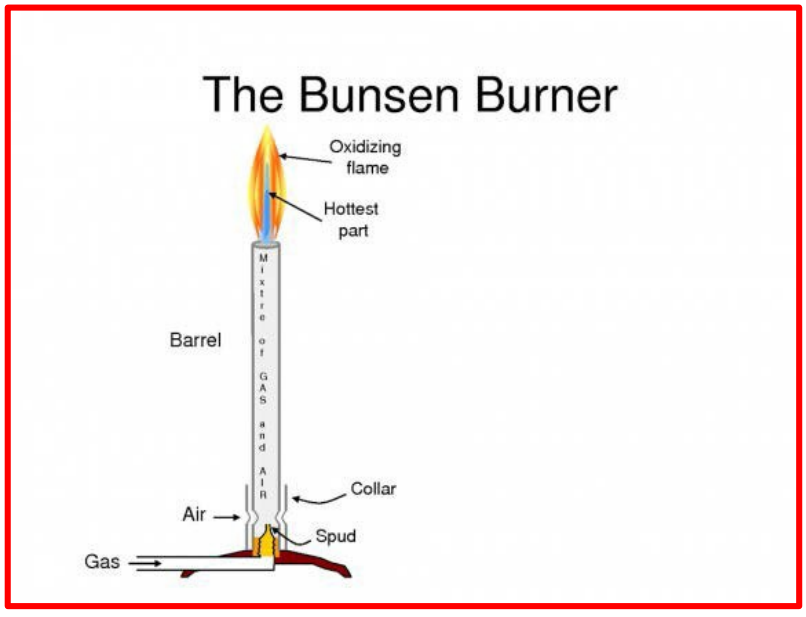
sterile loops for inoculation. Spare gas cylinders must be safety and properly stored.

8.6d Open Flame Device Exemption form

The Open Flame Device Exemption form is used to document the research need for open flame devices which cannot be met using alternative devices and methods. If your laboratory uses an open flame device, please complete the exemption form linked below.

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.
- Utilize 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 safe-guarding.

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 unmcsafety@unmc.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.

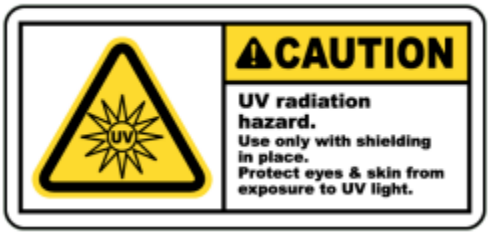
- **Class 3b**: Lasers or lasers systems that can produce a hazard if viewed directly. This includes intrabeam viewing of specular reflections.
- **Class 4**: High power lasers and laser systems capable of causing severe eye damage with short- duration (<0.25 s) exposures to the direct, specularly reflected, 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 Ultraviolet (UV) Radiation

Some laboratory equipment can generate concentrated UV radiation in all the spectral regions. High intensities of UV light are hazardous to the eyes and can injure the cornea, the outer protective coating of the eye, in as little as a few seconds of exposure.

Laboratory sources of UV light may include germicidal lamps in biological safety cabinets (BSCs), nucleic acid transillumination boxes, nucleic acid crosslinkers, curing lamps, and UV lasers. The best method of protection is to avoid exposure. Do not use transilluminators without the protective UV shield in place. Keep shields clean and replace them when damaged. Never operate equipment with missing, broken, or improperly functioning shields or interlocks. Never override safety interlocks.

All laboratory personnel are required to follow the Ultraviolet (UV) Radiation Hazards Safety Guideline. Areas where UV sources are present must be properly identified to alert users of the hazards.



8.9 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.

8.10 Sterilization Facilities on Campus

The Department of Pathology and Microbiology provides centralized services for dishwashing and autoclaving to our faculty on the UNMC campus. We support three locations: 4th floor of Wittson Hall (WHM 4020), 11th floor of Lied Transplant Center (LTC 11738), and 4th floor of Durham Research Center 2 (DRCII 4009), the latter of which is

run in conjunction with Eppley Institute.

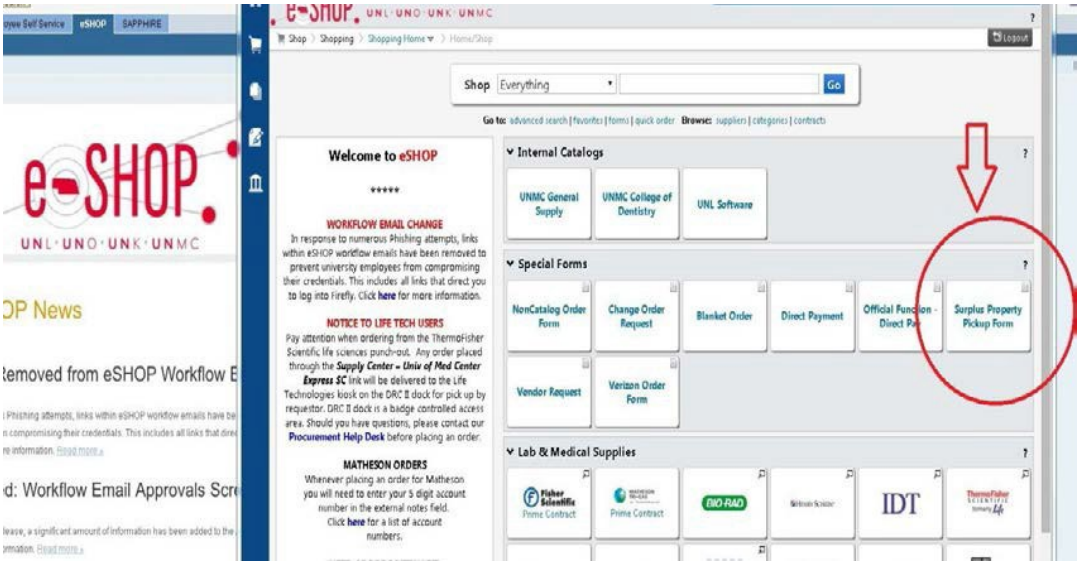
Services include mechanical and hand washing of laboratory dishware. We offer self- and full service autoclaving, as well as the processing and disposal of hazardous biological waste materials. To utilize the facilities, you must be fully trained on the equipment.

More information is available on-line at:
https://www.unmc.edu/pathology-research/resources/sterilization.html

8.12 **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 contact General Supply at 402-559-5220 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 thru the Archibus system.

9.1 Fume Hood & Biosafety Cabinets

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.

Laboratories are expected to follow policies and procedures as outlined in the references below.

Laboratory Hoods – What's the Difference?

Laboratory Fume Hoods Safety Guideline

Laboratory Hood Manual

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 in DRC I and II

DRC I and II have been upgraded to a new fast acting fume hood control system. This system is designed to react instantaneously and rebalance airflows within 3 seconds of movement of the fume hood sash. The main objective of the system is safety, but it also provides energy conservation. Facilities will now be able to monitor all sash positions. The fume hood sash should ALWAYS be closed when not in use and especially when the lab is unoccupied. Below are instructions for basic operation of the new system under various scenarios.

9.3a Normal Operation

During normal operation, the fume hood monitor will show the current face velocity in ft/min. This flow should be right around 100 ft/min. There are three LED lights below the screen that are green, yellow, and red. Green represents normal operation, yellow represents caution as the air flow has deviated from the set point of 100 ft/min, and red represents danger because the flow has significantly deviated from the set point.

9.3b Alarm Mode / Purge Mode

When the exhaust air flow is significantly above or below the recommended 100 ft/min, the red warning light will come on, the screen will display “HI FLO”, “LO FLO”, “HIGH FACE VELOCITY”, or “LOW FACE VELOCITY” and an audible alarm will notify the occupants. This could be from the sash being opened too far, past the operating height, or a mechanical issue. You should first try to lower the sash if opened all the way to allow the flow to adjust accordingly.

You may also press the button with an image of a silenced horn to momentarily silence the noise. If the issue is not addressed and the silence button is pressed, it will start alarming again after the silence timer runs out. The second mode is Purge Mode which is enabled from an air sensing system called Aircuity (only in DRC-1, DRC-2 will have a zone presence sensor on the fume hood to determine occupancy for exhaust air flow reduction). This is a detector mounted in the wall next to the fume hoods and absolutely should not be tampered with. Aircuity will sense odors from spills, but also from normal use of products like alcohol. All containers should be sealed when not in use in order to avoid false trips of the system.

When the Aircuity system detects toxic or volatile fumes, it will send the fume hood to full exhaust flow to remove all pollutants. It will remain in this mode until it no longer detects those pollutants. The monitor will display “UOC”, the red LED indicator light will be on, and the audible alarm will start.

If it is a mechanical issue, please call the Facilities Help Desk at (402) 559-4050.

9.3c Emergency Purge Mode

On the fume hood monitor there is a button with red lettering labeled “EMERGENCY PURGE”. This button is to be pressed if there is a spill in the lab or the hood. When this button is pressed the red LED will turn on, the audible alarm will start, and the fume hood monitor will display “EMERGENCY PURGE” and “EEE”. Once the button is pressed, this mode will set the exhaust air flow to 150% of its designed flow and will do so for 300 seconds and then return to normal operation.

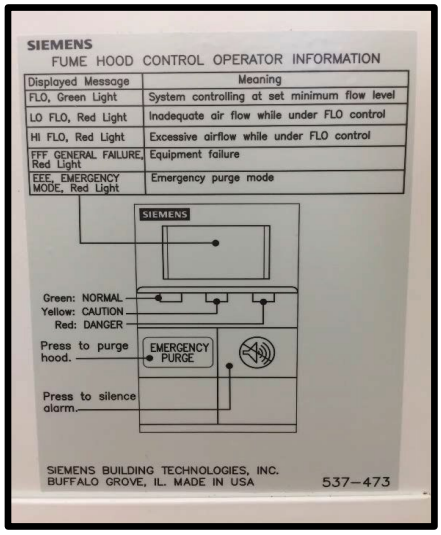


Image of reminder decal placed on fume hoods.

9.4 Plumbing Systems

Make sure a strainer is present in your sink drains to prevent objects from falling into the plumbing. 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 in 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 Help Desk at (402) 559-4050.

10.0 Laboratory Waste

Policies and procedures regarding waste within the laboratory can be found in the UNMC Waste Handling policy.

10.1 Biohazard Waste

Biohazardous waste will be managed and disposed of in accordance with DOT, EPA, OSHA, and State of Nebraska Regulations. Biohazardous waste (infectious waste or medical waste) is waste contaminated with biological material that is infectious or potentially infectious to humans, animals, or plants. Materials contaminated with recombinant and synthetic nucleic acids, as well as genetically modified organisms are also considered biohazardous. Please contact EVS at (402-559-4073) for biohazardous waste containers. Disposable sharps containers must be purchased by the department.

Proper disposal of items in red biohazard waste bins: Biohazard Waste Guidance

How to install red bags and properly close red bags: Red Bags and Container Guidance

10.2 Definition of Sharps

10.2a Sharps

Biohazardous sharps waste includes but is not limited to needles, syringes, scalpels, glass microscope slides, cover-slips, glass blood vials, Pasteur pipettes, plastic sharps (serological pipettes and pipette tips), razor blades, and contaminated broken glass. **Uncontaminated medical/research sharps (such as needles, syringes, scalpels, serological pipettes, pipette tips, etc.), although not contaminated, may be perceived as infectious when presented for disposal and must be handled as biohazardous sharps waste.**

Biohazardous sharps must be disposed of in leak-proof, rigid, puncture-resistant and break-resistant sharps containers. These containers must be closed when they are 3/4 full. Sharps containers should be bagged and sealed as outlined above if they contain liquids in the form of blood, body fluids or medications. Disposable sharps containers four (4) gallons or smaller are sealed closed and placed in the biohazard waste tub for disposal. Larger disposable sharps containers which will not fit into biohazard tubs for shipping must be in an approved container. Contact EHS for additional information.

The use of reusable sharps containers is acceptable with the approval from EHS. Reusable sharps containers regardless of size are closed and then transported by the vendor to a facility which handles emptying and disinfecting the containers, as well as decontamination of the sharps for disposal.

Pipettes and pipette tips readily puncture biohazard waste bags and must be disposed of in a rigid container (biohazard bag lined cardboard box). Lining pipette disposal box with plastic keeps residual liquids from soaking the box and seeping onto the floor/counter. Once pipette disposal boxes are full, they must be taped shut and placed into biohazard waste bin.

10.2b Non-Sharps

Solid (non-sharps) biohazardous waste including contaminated disposable PPE, culture materials, samples, specimens, shall be placed into tear-resistant, leak-proof, and secured red biohazard bags to prevent leakage or expulsion of solid or liquid waste during storage, handling or transport. Bags will meet current tear and impact resistance requirements will conform to current maximum size and weight restrictions and will be labeled with the universal biohazard symbol (reference requirements in 49 CFR 173.134, 49 CFR 173.197, 49 CFR 173.24, 49 CFR 173.24a). The top of the inner bag must be closed by twisting and tying in a single knot. The infectious waste bags should be placed directly into rigid reusable containers supplied by the waste contractor at the site of waste generation.

10.3 Disposal of Glassware

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

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

10.4 Chemical Waste

Chemical waste is any chemical or chemical material that is used or no longer needed and destined for disposal. Chemicals and chemical materials are disposed of in accordance with the EPA regulations.

UNMC is also required by EPA to have a Waste Minimization Plan for hazardous waste. Use the Chemical Disposal Fact Sheet for guidance on disposing chemicals. For information on some specific chemical waste streams, please see the Hazardous Material Fact Sheets. Nebraska Public Service Laboratory waste will be handled per internal guidelines and chain-of-custody requirements. For additional information on chemical disposal, please contact EHS at (402-559-6356).

Liquid Chemical Waste
Certain non-hazardous liquid chemicals can be disposed to the sanitary sewer. Please see the Hazardous Material Fact Sheet Sanitary Sewer Disposal for a list of these chemicals. All other liquid chemicals and chemical waste must be tagged and given to EHS for proper disposal.

Solid Chemical Waste
Solid chemicals and chemical waste must be tagged and given to EHS for proper disposal. Chemical waste cannot be disposed of in the trash.

Empty Chemical Containers
Empty containers must be properly handled to ensure the safety of laboratory and EVS staff. Please see the Hazardous Materials Fact Sheet Empty Chemical Container Disposal.

10.5 Recycling in the Laboratory

While reducing and reusing are best, you are bound to use items on campus that you will no longer need. Reusing and recycling is available for numerous materials.

If you have on-campus items that may be of use to somebody else, post it for free on LiveGreen Supply Exchange . Laboratory supplies and equipment are welcome, as are office supplies. You can also post items you are looking for/commonly use.

Information for on-campus recycling can be found on the UNMC Live Green website at: *http://livegreennebraska.com/programs-initiatives/on-campus-resources/*

For additional information about UNMC Live Green and recycling initiatives on campus, please contact LiveGreenNebraska@unmc.edu

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 ensures compliance with state and federal regulations, to protect UNMC employees, students, the public, and the environment. The UNMC RSO also oversees the use of radioactive material at Nebraska Medicine and manages the personnel radiation monitoring program (e.g., radiation badging, bioassays) for both UNMC and the hospital.

11.1 Radiation Safety Manual

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

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

Additional resources for Radiation Safety are available online.

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. To review the policies and procedures please visit the IBC Website. Please also reference the Biosafety Manual. 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: http://www.unmc.edu/ibc/research-resources/index.html

Guidelines

12.2.1 CDC/NIH Biosafety in Microbiological and Biomedical Laboratories
12.2.2 CDC/NIH Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets
12.2.3 Health Canada: Laboratory Biosafety Guidelines
12.2.4 NIH Guidelines for Research Involving Recombinant DNA Molecules, October 2011
12.2.5 WHO Laboratory Biosafety Manual

Websites

12.2.6 American Biological Safety Association
12.2.7 CDC Import Permits Program
12.2.8 CDC Select Agent Program
12.2.9 Health Canada MSDS - Infectious Substances
12.2.10 OSHA Bloodborne Pathogen Standard (29CFR 1910.1030)
12.2.11 Risk Group Classification for Infectious Substances

13.0 Comparative Medicine

Comparative Medicine provides professional veterinary medical, husbandry and proposal review services to support animals used in biomedical research. The UNMC animal care and use program has been accredited by AAALAC International since 1966. The accreditation process provides continuing voluntary peer review of the UNMC program by internationally recognized experts. UNMC 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 UNMC 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.

Comparative Medicine website: https://info.unmc.edu/comparativemed/

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

13.2 Services & Training

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

Our Research Technical Services team is available to help with your animal research projects. Contact the CM Office at (402) 559-4034 or compmed@unmc.edu if you have questions.

Additional information can be found on-line at:
https://info.unmc.edu/comparativemed/services/index.html

14.0 Research Information Technology Office

The Research Information Technology Office (RITO) was established to meet the growing IT needs of researchers. RITO works closely with UNMC's Information Technology Services (ITS) and other college/departmental IT entities to fulfill the specialized IT needs of researchers.

RITO serves all of UNMC's colleges and institutes and we collaborate with the research community to develop proposals for the National Strategic Research Institute (NSRI) and other funding entities.

Research Information Technology Office Website

For more information, contact the RITO Director, Ashok Mudgapalli, MS, Ph.D., at (402) 559-9072 or Ashok.Mudgapalli@unmc.edu

15.0 Laboratory Safety Audits

All laboratories are audited on an annual basis by the UNMC Environmental Health and Safety Office to ensure compliance with federal, state and university requirements. Audits 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 audits, or need to report any unsafe lab practices please contact the EHS Office at (402) 559-6356.

15.1 Focus and Function

As we all play an important role in research on campus, it is required that each lab be audited according to policy. Based on the research being conducted in your lab, you are subject to various lab audits/inspections at any time. Outlined below are the various on-campus departments in which your lab may be inspected and/or audited by. There may be times when joint laboratory audits are conducted amongst the on-campus departments listed. If that is the case, the laboratory PI will be notified prior to the audit(s).

15.1a EHS Laboratory Safety Audit: EPA/OSHA Regulations

The purpose of annual lab audits is to ensure all labs are following the appropriate lab safety policies and procedures within their research labs. Lab safety audits are conducted on an annual basis and scheduled through the EHS. Each lab will be contacted to schedule the annual audit which 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 UNMC 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 UNMC personnel become familiar with EPA and OSHA regulatory compliance inspection interviews.

Annual laboratory safety audits should be viewed as a positive management tool that provides the user and UNMC with an opportunity to assess environmental impacts and correct any potential problems prior to a regulatory inspection.

- **Laboratory Safety Audit Guide** - The information provided in the laboratory safety audit guide is a supplement of standards and explanations to the audit items organized by category on the laboratory safety audit checklist. The explanations provided are supported by government and/or state regulations or are considered to be best practices by accredited and respected resources.
- **Laboratory Safety Audit Checklist** - The laboratory safety checklist covers EPA and OSHA regulations. The checklist should be reviewed by the laboratory PI and all laboratory personnel. Laboratory safety audits are conducted annually by EHS.

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 Pete Iwen, Ph.D. at (402) 559-7774.

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 UNMC 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 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

UNMC has implemented a hazard tracking system on campus to report any unsafe practices or conditions. This program is maintained by EHS in accordance with UNMC policy.

In the event an unsafe practice or condition is cited, the information is submitted to the hazard tracking system. This system will generate an email to the appropriate individuals, assigning them the task to correct the hazard. A reminder email is sent every 7 days to both the person assigned to take corrective action, as well as the department area manager or administrator. Reminder emails will continue being sent until the item has been corrected.

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

All requests for major or minor structural changes in Research 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:** To receive approval, complete the Lab Project Review Form with a detailed description of the requested changes, and scientific or other justification, in writing. Send completed form to the Julie Sommer, Research Resources Manager, DRC 1007, Campus Zip 5875. The form will be reviewed by the Approval Committee.
  Once a decision has been made, you will be contacted by Julie Sommer.

  The form should also be used to request additional furniture beyond what is already furnished or repair of existing laboratory facilities. There are campus standards for furniture in each building. Therefore, facilities will need to approve any new furniture purchases.

- **Timing:** The approval committee meets monthly but cannot assure a request will be completed sooner than 6 months from application, including for new faculty hire, unless justification is given of need for continuation of ongoing scientific experiments (such as installation of 220v outlet for a new piece of scientific equipment).

- **Cost estimates:** can be obtained prior to approval, but no work can be initiated until institutional approval has been given.

- **Consequences if unapproved changes are made:** The department will be responsible for all costs associated with returning the space to its original condition.

Specific types of requests:

- **Separation of lab modules:** Lab modules may be separated only if there is a valid scientific reason for the separation. The aisle between modules must not be blocked, narrowed or restricted with cabinets, desks, shelves, refrigerators, etc. The separation must be designed and approved by facilities to meet fire and life safety codes. Complete and submit a "Request for Laboratory Project Review" form to begin the process.

- **Doors:** Nothing is to be placed on fire doors or covering vision panels in corridor doors, as it may impede egress and may cause the door to fail prematurely. If there is a valid scientific reason for covering the window, you must complete a "Request for Laboratory Project Review" form so the proper material can be ordered and installed.
- **Repair of sinks cracked by dry ice:** Dry ice or liquid Nitrogen should never be placed in laboratory sinks as it will cause cracking. The cost to repair or replace laboratory sinks cracked by dry ice will be borne by the laboratory occupants.

- **Countertops**: Ultraviolet light will quickly degrade laboratory countertops. A protective sheet may be obtained through Facilities Management if UV light boxes +are used.

- **New Furniture and equipment purchases:** Any purchased furniture or equipment that will hook up to the building utilities (i.e. Fume hoods, Biosafety Cabinets, ice machines, etc.) must be approved and ordered through Facilities. New furniture must match existing furniture or check for compliance fire and life safety codes.

  Existing furniture provided to the occupants is the property of the building and cannot be removed from the office without written approval. Furniture and/ or laboratory equipment cannot be stored or placed in the hallway,
  except for the approved table/chair in the coffee/kitchenette areas. Tables and chairs cannot protrude into the corridor or interfere with exits.

16.2 UNMC Laboratory Close Out Policy

A laboratory close out involves the removal of chemicals from research laboratories, due to moves (relocations) or terminations and should not be thought of as a typical chemical waste pick up. For more information on this policy or if you have questions, contact EHS at (402) 559-6356. Please review the Laboratory Close Out Policy for additional information.

16.3 Laboratory Close Out Checklist

Laboratories must be left in a state suitable for new occupants. The vacating Principal Investigator (PI) and department are responsible for the proper disposal of chemical, biological and radioactive waste materials, disinfection of all equipment and countertops, movement of equipment from the lab for surplus, repair, or relocation prior to vacating the space(s).

The laboratory is responsible for completing the Laboratory Close Out Checklist and scheduling a Lab Close Out Inspection with EHS.

17.0 Chemical Safety

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

Additional services include responding to spills/releases on a 24-hour basis, conducting internal OSHA/EPA/DOT audits and maintaining databases to comply with the recordkeeping requirements mandated by the regulations. Chemical Safety also monitors the reporting of “Chemicals of Interest”, pursuant to the Department of Homeland Security regulatory requirements and on-site chemical threshold planning quantities, related to the Emergency Planning and Community Right-to-Know Act (EPCRA).

17.1 Hazardous Material Fact Sheets

Environmental Health and Safety has developed Hazardous Material Fact Sheets for certain chemical/chemical products. Please use these as a quick reference to guide you as you generate and dispose of these items. If you have questions concerning these fact sheets or would like to see a fact sheet developed for other items, please contact EHS at (402) 559-6356.

17.2 Chemical Hygiene Plan

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

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

Questions?

UNMC

ENVIRONMENTAL HEALTH
AND SAFETY

Contact EHS at (402) 559-6356
Email: unmcehs@unmc.edu