

Liberty University Chemical Safety Program



Purpose

Liberty University is committed to providing a safe and healthful work and learning environment for its employees, students and others who may be affected by the hazards associated with Chemicals.

Because of the hazardous nature of Chemicals, the potential for exposure to Chemicals can determine whether a Chemical is covered by this program. If the Chemical is not hazardous, then it is not covered by this Program. If there is no potential for exposure (e.g., the Chemical is inextricably bound and cannot be released), it is also not covered by this Program.

The Federal Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (HCS) was promulgated to ensure that all Chemicals would be evaluated and that information regarding the hazards would be communicated to employers and employees. The goal of this standard is to reduce the number of Chemically related occupational illnesses and injuries. The OSHA HAZCOM standard is an important component of this Chemical Program. The [LU HAZCOM Program](#) provides more detailed and specific information and should be reviewed in conjunction with this Program.

Each employee who may be exposed to hazardous Chemicals under the normal conditions of use, or in a foreseeable emergency, is responsible for following the guidance provided within this Program. All employees are expected to adhere to information provided during Chemical Safety Training, information provided in Safety Data Sheets (SDS), or other safety information readily available and related to hazardous Chemical use.

University Emergency Resource and Contact List

In the case of exposure or potential exposure to Chemical hazards, if an individual is unresponsive or unconscious, call LUPD at 434-592-3911. Do not enter a room where a suspected hazard has caused unconsciousness. Follow the “Decontamination Procedures and First Aid Measures” as outlined in a HAZCOM Plan or Chemical Hygiene Plan (CHP). Only attempt to extinguish small fires (such as small trash can fire), if confident to do so, and evacuate in all other fire situations. Report all accidents, incidents, unsafe conditions or near misses to your supervisor or faculty member immediately.

EMERGENCY RESOURCE	CONTACT INFORMATION	PURPOSE AND RESPONSIBILITIES
<p>Liberty University Police Department (LUPD) Green Hall Under the Office of Security & Public Safety</p>	<p>Emergency Assistance: Emergency number with campus phone: 3911</p> <p>Emergency number with cell phone: 434-592-3911</p> <p>Non-Emergency Assistance: 434-592-7641</p>	<p>LUPD maintains an Emergency Communication Center 24 hours a day, 7 days a week. Call LUPD for emergencies of any kind, including but not limited to fire, medical emergency, or hazardous material spills or release.</p>
<p>Environmental Health and Safety 3552 Young Place Under the Office of Security & Public Safety</p>	<p>Phone: 434-582-3389 Email: lusafety@liberty.edu If after hours or no answer at above number, you may contact EHS through the LUPD Non-Emergency Communication Center 434-592-7641</p>	<p>EHS provides guidance and support pertaining to occupational, environmental and life safety issues including training. EHS provides support for hazardous material spills and releases, fires, gas and water emergencies, biological issues as well as radiological issues. EHS works closely with the Lynchburg Fire Department, Virginia State Police Joint Hazard Assessment Team, and Government Compliance Officers.</p>
<p>Emergency Management 4550 Mayflower Drive Under Office of Security & Public Safety</p>	<p>Phone: 434-592-7674 Email: luem@liberty.edu If after hours or no answer at above number, you may contact EM through the LUPD Non-Emergency Communication Center 434-592-7641</p>	<p>EM provides preparedness guidance and support for all manner of human, natural, technological, and hazardous materials critical incidents. EM also provides continuous training on the preparedness cycle, provides incident command infrastructure support, and hazard mitigation and recovery support.</p>

<p>Facilities Management (FM) 4000 Mayflower Drive</p>	<p>If Facilities Management operations is needed contact LUPD Emergency Assistance at 434-592-3911 and they will contact Facilities Management.</p>	<p>Facilities Management responds to all fire alarms, and other emergencies to provide support for the LUPD and LFD. This support includes, but is not limited to, the operating/resetting of the fire alarm system (also responsible for maintaining fire prevention and alarm systems); Elevator maintenance, operating the heating, ventilation, and air-conditioning systems (HVAC); and the shutdown of steam, water, electrical and other utilities. Additionally, FM personnel are responsible for maintenance, housekeeping and controlling of fuel hazards.</p>
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Glossary of Terms

<u>Term</u>	<u>Definition</u>
CHO (Chemical Hygiene Officer)	A designated, competent employee and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. The CHO has responsibility for CHP requirements for any laboratory/ies in their area. The CHO shall review the CHP annually and make revisions where required. The CHP will additionally be reviewed and approved by the Department Chair.
CHP (Chemical Hygiene Plan)	Means a written program developed and implemented by the employer which sets forth procedures, equipment, Personal Protective Equipment, and work practices that (i) are capable of protecting employees from the health hazards presented by hazardous Chemicals used in that particular workplace
DOT	U.S. Department of Transportation, which regulates hazardous substance identification and transportation
EPA	U.S. Environmental Protection Agency
Exposure	The concentration or amount of a particular agent (Chemical, biological, electrical, electromagnetic field (EMF), or physical) that reaches a target organism, system, or subpopulation in a specific frequency for a defined duration.
GHS	Globally Harmonized System for classification of Chemicals, particularly to provide Global consistency for Pictograms and SDS associated with all Chemicals
Hazardous Chemical	OSHA defines a hazardous Chemical as a substance for which there

	is statistically significant evidence, based on at least one scientific study, showing that acute or chronic harm may result from exposure to that Chemical. Additionally, it means any Chemical which is classified as a health hazard or simple asphyxiant in accordance with the Hazard Communication Standard (§1910.1200).
Health Hazard	Means a Chemical that is classified as posing one of the following hazardous effects: Acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration hazard. The criteria for determining whether a Chemical is classified as a health hazard are detailed in appendix A of the Hazard Communication Standard (§1910.1200) and §1910.1200(c) (definition of "simple asphyxiant").
Irritant	A substance that can inflame or irritate the skin, eyes, nose, throat, or lungs
Laboratory	Means a facility where the "laboratory use of hazardous Chemicals" occurs. It is a workplace where relatively small quantities of hazardous Chemicals are used on a non-production basis.
Laboratory (Fume) Hood	Means a device located in a laboratory, enclosure on five sides with a moveable sash or fixed partial enclosed on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows Chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.
Laboratory use of Hazardous Chemicals	Means handling or use of such Chemicals in which all of the following conditions are met: (i) Chemical manipulations are carried out on a "laboratory scale;" (ii) Multiple Chemical procedures or Chemicals are used; (iii) The procedures involved are not part of a production process, nor in any way simulate a production process; and (iv) "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous Chemicals.
Mutagen	Means Chemicals that cause permanent changes in the amount or structure of the genetic material in a cell. Chemicals classified as mutagens in accordance with the Hazard Communication Standard (§1910.1200) shall be considered mutagens for purposes of this section.

Online Chemical Database	A web-based repository where LU Safety Data Sheets (SDS) are stored, maintained, and updated for the most current version
OSHA	Occupational Safety and Health Administration
NFPA	National Fire Protection Association
Pa	Pascal (a measure of force per unit area)
Physical Hazard	Means a Chemical that is classified as posing one of the following hazardous effects: Explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid, or gas); self-reactive; pyrophoric (gas, liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; in contact with water emits flammable gas; or combustible dust. The criteria for determining whether a Chemical is classified as a physical hazard are in appendix B of the Hazard Communication Standard (§1910.1200) and §1910.1200(c) (definitions of "combustible dust" and "pyrophoric gas")
Permissible Exposure Limits	For laboratory uses of OSHA regulated substances, the employer shall assure that laboratory employees' exposures to such substances do not exceed the permissible exposure limits specified in 29 CFR part 1910, subpart Z.
PPE	Personal Protective Equipment related to safety
Pyrophoric	Liable to ignite spontaneously upon exposure to air at, or below 54 Degrees C or within 5 minutes of exposure to air
Respiratory Hazard	The concentration of a substance that can produce health hazards when inhaled
Route of Entry	The way Chemicals can enter the body, such as breathing, swallowing or skin absorption
SDS	Safety Data Sheets as required by OSHA's "Right to Know" Hazard Communication Standard
Skin Absorption	The process in which a Chemical can pass directly through the skin and enter the bloodstream
TLV	Threshold Limit Value: represents the amount of substance which most people can be exposed to on a day-to-day basis without harmful effects
UN	United Nations
WC	Water Column (a unit of pressure measurement)

I. SCOPE

This Program provides detail on the following:

- Labeling of hazardous Chemicals including placarding requirements as per the NFPA.
- Structure of Safety Data Sheets (SDS documents) as required by the OSHA HAZCOM standard
- DOT storage and classification requirements of hazardous Chemicals
- Alignment with the UN Globally Harmonized System (GHS) of Classification and Labeling of Chemicals

Additionally, with regards to Laboratories, OSHA requires that all laboratories establish a **Chemical Hygiene Plan (CHP)** to explain how the facility will minimize personnel exposure to hazardous Chemicals. For this reason, Laboratory safety will be addressed in the Scope of this program, but more detailed information is available and should be reviewed in the [LU Laboratory Safety Program](#).

Chemical Safety Training shall include all of the principles of the GHS system, including recognition of Safety Data Sheet (SDS) requirements, classification, and DOT labeling and storage requirements of hazardous Chemicals including information on NFPA placarding.

II. Responsibility for Chemical Safety

A. Departmental Responsibility

Each LU Department is responsible for Chemical safety including, but not limited to the following:

Allocating the personnel and resources to facilitate a safe working environment, safe working practices and safe handling and disposal of hazardous Chemicals, materials, and waste

- LU Laboratories should have a designated Chemical Hygiene Officer (CHO) available at all times. Laboratory Management may choose to delegate responsibility for safety, including the roll of CHO, to lab employees, and staff personnel (such as a safety liaison or other lab worker) in a clear and unambiguous manner and hold them accountable for those areas to which their responsibility pertains.
- Each Department must maintain a list of hazardous Chemicals present in the workplace covered by this program. This list is a Departmental inventory of Safety Data Sheets (SDS),
- Purchasing for each department should ensure that all Chemicals purchased receive up to date SDS information either directly with the product or in some other accessible means of immediate retrieval. The information obtained from SDS documents is absolutely critical to Chemical Safety; therefore, when any new Chemical is purchased or introduced to the LU work environment, an up to date (Revised in the last three year) SDS must be obtained, and the departmental list must be revised.

Chemical hazards in all forms - liquids, solids, gases, vapors, fumes, and mists - whether they are "contained" or not should be assessed. Identify Chemicals in containers, piping systems, and those generated from work operations, such as welding fumes, dusts, and exhaust fumes. Read the labels to determine if they are hazardous. Look for words such as "DANGER", "WARNING", "FLAMMABLE", "COMBUSTIBLE", "EXPLOSIVE", "OXIDIZER", "REACTIVE", "CORROSIVE", "CARCINOGEN", "IRRITANT" to help determine if they should be included.

B. LU Office of Environmental Health and Safety (EHS)

LU EHS is responsible for designing, implementing, overseeing, and updating the Chemical Safety Program and to:

- Annually review and revise the Chemical Safety Program as necessary
- Maintain the written program on the EHS website
- In conjunction with Supervisors and Faculty, identify areas where hazardous Chemicals are used.
- Laboratories, shops, and studios, using hazardous Chemicals and/or as indicated by Hazard Communication Signs
- Inspect areas that use hazardous Chemicals to evaluate compliance with the Chemical Safety Program
- Provide access to Safety Data Sheets through an online database
- Provide Chemical Safety Training or content for Chemical Safety Training (see training section)
- Provide guidance on compliance with the Chemical Safety Program
- Serve as point of contact with local, state, and federal officials with regard to the Chemical Safety Program

C. Supervisors/Faculty

Supervisors and Faculty who oversee the daily operations/work/research and safety of personnel have specific responsibilities under the Chemical Safety Program. For the work area(s) and personnel for whom they are responsible, supervisor and faculty responsibilities are to:

- Identify all hazardous Chemicals within the work area that they oversee
- Identify employees and students under their supervision that work with hazardous Chemicals
- Ensure all employees and students that work with hazardous Chemicals receive Chemical Safety Training
- Provide Chemical specific hazard information for materials used in their work area(s) upon initial employment, and any new Chemical hazards introduced thereafter

- Ensure that employees minimize any potential exposure with available engineering controls, safe work practices and necessary or assigned personal protective equipment.
- Update the online Chemical inventory list and Safety Data Sheets (SDS's) as new products are brought into the workplace. NOTE: This includes any inventory carried on vehicles used in field operations.
- Review Chemical inventories for their locations on annual basis
- Instruct employees on the GHS labeling requirements
- Ensure that all hazardous Chemicals in secondary containers are properly labeled and updated

D. Contractors

For any contractor performing work for Liberty University, the Supervisor or LU Project Manager can provide any SDS, or other information requested, including but not limited to:

- The hazardous products to which they may be exposed
- Administrative or engineering controls and/or protective measures the contractor's employees must take in order to avoid the risk of exposure, including required PPE
- Labeling system in use
- Contractors who bring Chemicals into a work area are required to provide Liberty University with appropriate hazard information, including labels and precautionary measures for handling, use, and storage of the product
- Contractors are responsible for labeling all Chemical/Chemical containers that are brought onto the jobsite and/or into a Liberty University facility
- Contractors shall provide copies of SDS's to the job Project Manager, LU EHS Officer, and/or designee for any Chemicals used for projects on customer jobsites and/or in Liberty University facilities
- Chemicals brought on-site by contractors must be removed by the contractor once the scope of work is completed.

E. Employees and Students

People who may be exposed to hazardous Chemicals under the normal conditions of use, or in a foreseeable emergency are expected to comply with the University's Chemical Safety Program. Their responsibilities are to:

- Complete Chemical Safety Training
- Use proper engineering controls and Personal Protective Equipment
- Report unsafe conditions or accidents to your supervisor or instructor
- Follow the guidance in the Chemical Safety Program.

III. Chemical Safety in the Laboratory

A. General Laboratory Safety Requirements

University personnel using hazardous materials in their research and/or teaching laboratories, or any other space where Chemicals are used/stored, must generate an inventory listing and work with LU EHS to update it annually.

Laboratory-responsible employees shall refer specifically to the requirements of the Liberty University Laboratory Safety Program with regards to the use, storage, cleanup, and other specifics of Chemicals used within the Laboratories and shall additionally ensure that:

Information

Employees shall be informed of:

- This Program
- The location and availability of the respective Laboratory Chemical Hygiene Plan
- The permissible exposure limits for OSHA regulated substances, or recommended exposure limits for other hazardous Chemicals where there is no applicable OSHA standard
- Signs and symptoms associated with exposures to hazardous Chemicals used in the laboratory
- The location and availability of known reference material on the hazards, safe handling, storage, and disposal of hazardous Chemicals found in the laboratory including, but not limited to, Safety Data Sheets received from the Chemical supplier.
- How to retrieve the required SDS information for each Chemical to which they may be exposed before the Chemical is used in the Laboratory. LU EHS maintains a Chemical database program to be used for this purpose.
- The reasons for following established and written protocols and/or standard operating procedures (SOPs) for laboratory activities and experiments
- How to identify and demonstrate the appropriate use of PPE for Chemicals used in the Laboratory.
- How to describe and demonstrate methods to prevent spills, including situations involving falling containers, or when transferring and transporting Chemicals.

The **Chemical Hygiene Plan** must designate a **Chemical Hygiene Officer (CHO)** whose primary responsibility is laboratory personnel, including student safety. The CHO:

- Will manage any issues for any hazards specific to individual laboratories, including personnel training, and this shall be addressed in the CHP, which shall be prepared by every laboratory
- Will ensure that a hazard and risk assessment is incorporated into all Hygiene Safety Plans as an integral concept. Employees and Student Workers should be able to assess the risks of specific hazards
- Manages Risk as the probability of being injured from exposure to a hazard for Employees and Student Workers, and must be able to determine the severity of a specific hazard and give an estimation of the likelihood of exposure (this is a definition of risk) to that hazard under certain conditions

B. CHO (Chemical Hygiene Officer)

- Must be Qualified by training or experience to provide technical guidance development and implementation of the Laboratory Safety Program
- Has responsibility to develop and update the CHP on an annual basis at minimum, including all Departmental-required revisions and updates
- Responsible for assuring communication and training on the CHP for all affected employees, student workers, and others
- Assumes the role of Liaison with LU EHS Department
- Approves and reviews all Chemical use and assures updates to the inventory lists
- Maintains and provides all documentation where required
- Provides communication with other LU Laboratories where required
- Facilitates continuous improvement for Program-related updates or new beneficial information
- Meets at least annually with LU EHS to provide and review assessments completed by the CHO or by LU EHS

C. Safety-Related Responsibilities of Lab Personnel

- Monitor operations for safety, advising laboratory supervisors on safety matters, and serve as a focus for safety concerns of the laboratory staff.
- Work with the CHO to develop and maintain a Chemical Hygiene Plan (CHP).
- Check the status or operation of general safety equipment such as fire extinguishers, drench hoses, safety showers and eyewash stations.
- Educate personnel in the procedures, safe operations, and the use of Personal Protective Equipment.
- Maintain constant communication with the designated Lab CHO and assure that necessary training is provided for these personnel, which may include needed updates to periodicals, society memberships or meetings to stay abreast of all latest requirements and advancements.

- Investigate accidents and report them to the appropriate supervisors, Human Resources and LU EHS.
- Conduct internal safety assessments and recommend improvements.
- **Monitor storage, labeling and use of hazardous Chemicals.**
- Ensure that all hazardous waste regulations are followed and that employees receive formal, annual training (If applicable).
- Maintain safety-related files, accident reports, safety equipment, and SDS's
- Maintain a complete written current inventory of all Chemicals.

D. Managing Chemical Safety in the Laboratory

- The ACS (American Chemical Society) "*Identifying and Evaluating Hazards in Research Laboratories*" can be used to construct Laboratory Hazard and Risk Assessment procedures. This document also includes example and sample Laboratory Risk Assessment Forms in template format, which can be utilized for assessing hazards and risks. This publication can be found here: [Identifying and Evaluating Hazards in Research Laboratories \(acs.org\)](https://www.acs.org/pressroom/2014/04/identifying-and-evaluating-hazards-in-research-laboratories)
- Work with hazardous Chemicals/products should be done inside a properly functioning fume hood (for laboratory applications) or in a well-ventilated area.
- Avoid inhalation; always try to avoid breathing Chemicals.

V. General Chemical Safety Requirements

A. PPE

Always avoid contact with the skin for all Chemicals and hazardous substances. Appropriate clothing shall be worn by all persons entering the lab, including guests. The protective characteristics of this clothing must be matched to the hazard. General precautions for handling Chemicals must be adopted. Even for substances with no known significant hazard, exposure should be minimized.

PPE should always be selected by Risk Assessment methods employing the Hierarchy of Controls wherever feasible. This includes the use of Lab Coats.

- Select gloves carefully to ensure that they are impervious to the Chemicals being used and are of correct thickness to allow reasonable dexterity while also ensuring adequate barrier protection.
- Additional protective clothing shall be used when there is significant potential for skin-contact exposure to Chemicals.
- Inspect gloves, confinement boxes, hoods, aprons, etc. for contamination or holes which might compromise their protection qualities.

Face and Eye Protection is necessary to prevent ingestion and skin absorption of hazardous Chemicals: Careful review of all relevant SDS for Chemicals involved, and a Risk Assessment shall be performed related to all potentially required PPE in the Laboratory including Eye Protection.

The following shall apply to all researchers, student workers, instructors, and visitors:

- **At a minimum, safety glasses, with side shields, shall be used for all Chemical work.** Every student worker, instructor, and visitor in a chemistry lab where experiments or demonstrations are being performed **MUST** wear industrial quality eye protection devices that meet ANSI Z87 requirements.

Goggles

Chemical splash goggles are more appropriate than regular safety glasses to protect against hazards such as projectiles, as well as when working with glassware under reduced or elevated pressures (e.g., sealed tube reactions), when handling potentially explosive compounds (particularly during distillations), and when using glassware in high-temperature operations. Approved eye protection for people handling Chemicals must prevent both Chemical splashes and flying particles (e.g., from broken glass) from entering the eye. The minimum eye protection device that meets these requirements is goggles with hooded or indirectly ventilated ports. A **Face-Shield** may be required over glasses or goggles to further protect the face and neck areas where SDS and Risk Assessment indicate necessity.

Minimizing Chemical Exposures

Because all substances are potentially hazardous, precautions for handling Chemicals must be adopted. Even for substances with no known significant hazard, exposure should be minimized. In general:

- Avoid skin contact (absorption hazard)
 - Use appropriate personal protective equipment and apparel
 - Inspect gloves, confinement boxes, hoods, aprons, etc. for contamination or holes
- Avoid inhalation.
 - Do not purposely sniff Chemicals.
 - When possible, work with hazardous Chemicals/products inside a properly functioning fume hood (for laboratory applications) or in a well-ventilated area
 - Where engineering controls, such as the use of fume hoods, glove boxes, non-hazardous Chemical substitution, or local exhaust ventilation systems are not possible, appropriate respiratory protection should be used
- Avoid ingestion.
 - Never taste Chemicals.

- Never pipette laboratory Chemicals by mouth
- Do not eat/drink in areas where Chemicals are in use. Contamination of food/drink is possible
- Do not store food/drink near Chemicals. Chemical vapors may be absorbed by food
- Chemicals and Chemical equipment must not be allowed in areas designated for the consumption, storage, and handling of food stuffs
- Never use laboratory glassware or other containers to store or serve food/beverages
- Food must never be stored in the same refrigerator or freezer as Chemicals or biological samples
- Thoroughly wash hands after handling or using Chemicals
- Do not smoke in areas where Chemicals are in use

B. The Written HAZCOM Plan

Per OSHA 29CFR [1910.1200\(a\)\(2\)](#)

This occupational safety and health standard is intended to address comprehensively the issue of classifying the potential hazards of Chemicals and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legislative or regulatory enactments of a state, or political subdivision of a state, pertaining to this subject. Classifying the potential hazards of Chemicals and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a **Written Hazard Communication Program (Plan)** for the workplace, including lists of hazardous Chemicals present; labeling of containers of Chemicals in the workplace, as well as of containers of Chemicals being shipped to other workplaces; preparation and distribution of safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of Chemicals and protective measures.

Where hazardous Chemicals as defined by the OSHA standard are used in the workplace, Liberty University shall develop and carry out the provisions of a written **Chemical HAZCOM Plan** which is:

- Capable of protecting employees from health hazards associated with hazardous Chemicals in that laboratory
- Capable of keeping exposures below the limits specified by incorporating a Hazard and Risk Assessment
- The HAZCOM Plan shall be readily available to employees, employee representatives and students.

The HAZCOM Plan shall include each of the following elements and shall indicate specific measures that Liberty University will take to ensure laboratory employee and student protection:

- Standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous Chemicals, **which shall include the requirement for a Safety Briefing to be held when working with Chemicals and documentation thereof.**
- Criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous Chemicals including engineering controls, the use of personal protective equipment and hygiene practices; particular attention shall be given to the selection of control measures for Chemicals that are known to be extremely hazardous
- A requirement that fume-hoods and other protective equipment are functioning properly and specific measures that shall be taken to ensure proper and adequate performance of such equipment
- Provisions for employee information and training
- The circumstances under which a particular workplace or laboratory operation would require a procedure or activity that needs prior approval before implementation
- Provisions for medical consultation and medical examinations
- Designation of personnel responsible for implementation of the HAZCOM Plan including the assignment of a Chemical Hygiene Officer for a Laboratory Chemical Hygiene Plan, which is similar in scope and outline to a HAZCOM Plan
- Provisions for additional employee protection for work with particularly hazardous substances. These include "select carcinogens," reproductive toxins and substances which have a high degree of acute toxicity. These Special Provisions shall include, where applicable:
 - Establishment of a designated area
 - Use of containment devices such as fume hoods or glove boxes
 - Procedures for safe removal of contaminated waste
 - Decontamination procedures

Liberty University shall review and evaluate the effectiveness of the HAZCOM Plan (or Chemical Hygiene Plan) at least annually and update it, as necessary.

- Emergency Action Plans










The LU HAZCOM Template is available on the LU EHS Website and in Attachment A below.

C. Chemical Inventory Requirements

Each department, or work area, must maintain an Inventory of hazardous Chemicals used in their area of responsibility. An up-to-date Safety Data Sheet (SDS) must be maintained for each identified Chemical at all times. Purchasing records may be beneficial in identifying Chemicals required in the Inventory. Each Department should establish procedures to ensure that future purchases ensure all relevant SDS information is received and added or updated in the Inventory before using a material in the workplace.

- Look for Chemicals in all physical forms - liquids, solids, gases, vapors, fumes, and mists - whether they are "contained" or not.
- Inventory information should identify location and storage-type information for each Chemical
- A periodic cross-reference should be conducted to assure that SDS information is readily available for all Chemicals in the Inventory

VI. Chemical Labeling and SDS (Safety Data Sheets)

<p>Health Hazard</p>  <ul style="list-style-type: none"> • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity 	<p>Flame</p>  <ul style="list-style-type: none"> • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides 	<p>Exclamation Mark</p>  <ul style="list-style-type: none"> • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
<p>Gas Cylinder</p>  <ul style="list-style-type: none"> • Gases Under Pressure 	<p>Corrosion</p>  <ul style="list-style-type: none"> • Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals 	<p>Exploding Bomb</p>  <ul style="list-style-type: none"> • Explosives • Self-Reactives • Organic Peroxides
<p>Flame Over Circle</p>  <ul style="list-style-type: none"> • Oxidizers 	<p>Environment (Non-Mandatory)</p>  <ul style="list-style-type: none"> • Aquatic Toxicity 	<p>Skull and Crossbones</p>  <ul style="list-style-type: none"> • Acute Toxicity (fatal or toxic)

<p>Danger!</p>  <p>Sigma-Aldrich 3050 Spruce Street Saint Louis, MO 63103 USA Telephone: 1-800-325-5832</p>	<p style="text-align: center;">METHANOL</p> <p>Highly Flammable liquid and vapour. Toxic if swallowed, in contact with skin or if inhaled. Causes damage to organs.</p> <p>Keep away from heat/sparks/open flames/hot surfaces. No smoking. Do not breathe dust/fume/gas/mist/vapours/spray. Wear protective gloves/protective clothing.</p> <p>IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.</p> <p>IF exposed: Call a POISON CENTER or doctor/physician.</p> <p>See Material Safety Data Sheet for further details regarding safe use of this product.</p>
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Before using any Chemical, you shall familiarize yourself with the properties of that Chemical and its hazards. Manufacturers and vendors must supply Safety Data Sheets (SDS's).

Federal law requires that an SDS for all of the hazardous Chemicals used at a location must be readily accessible to employees. Electronic access is permitted as an alternative to paper copies as long as no barriers to immediate employee access are created (i.e., an employee asking a supervisor for access to an SDS constitutes a barrier. If electronic access is not provided for an employee, accessible paper copies are required.)

Researchers shall prepare SDS's for all compounds synthesized on campus. Also, the same compound, from different manufacturers requires an SDS from each manufacturer. Contact LU EHS for additional hazardous material information.

All LU Departments must maintain a SDS for each hazardous Chemical (or product) they use.

- All Chemical containers shall be labeled with complete Chemical names. Do not use abbreviations, codes, or formulas.
- Unlabeled/unknown Chemicals are not permitted. These must be analyzed, identified, and then submitted for hazardous waste disposal if they cannot be used. All costs associated with the disposal are the responsibility of the department in possession of the chemical.
- All Chemicals shall be dated upon receipt and again upon opening. It is especially important that this procedure be done for all reactive and peroxide formers such as ethyl ether, tetrahydrofuran, etc. Keeping materials beyond their expiration dates is a hazardous waste regulatory violation.

Always read an SDS prior to working with that material. It is here that you will learn invaluable information on how you can work safely: the hazards (health and physical), how to protect yourself from exposure (controls and PPE), signs and symptoms of exposure, proper handling,

and storage, and more. Familiarize yourself with the format; a standardized 16- section format was a result of the 2012 HCS revision that adopted the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

This format is required of all Chemical manufacturers in the United States and many countries worldwide. A short description of each section is shown on the OSHA Quick cards shown below:

All Safety Data Sheets will have the following 16 sections, in specific order, so employees will always know which section will provide which data, no matter what Chemical is being reviewed.

OSHA® QUICK CARD™

Hazard Communication Safety Data Sheets

The Hazard Communication Standard (HCS) requires chemical manufacturers, distributors, or importers to provide Safety Data Sheets (SDSs) (formerly known as Material Safety Data Sheets or MSDSs) to communicate the hazards of hazardous chemical products. As of June 1, 2015, the HCS will require new SDSs to be in a uniform format, and include the section numbers, the headings, and associated information under the headings below:

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4, First-aid measures includes important symptoms/effects, acute, delayed; required treatment.

Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.

Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information*
Section 13, Disposal considerations*
Section 14, Transport information*
Section 15, Regulatory information*

Section 16, Other information, includes the date of preparation or last revision.

*Note: Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15 (29 CFR 1910.1200(g)(2)).

Employers must ensure that SDSs are readily accessible to employees.
See Appendix D of 29 CFR 1910.1200 for a detailed description of SDS contents.

For more information:
OSHA® Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

OSHA 3499-02-2012

A. NFPA Labeling and Placarding


Labels and Hazard Communication Signs

The Hazard Communication Standard (HCS) requires manufacturers to label original containers for hazardous Chemicals with the following 6 elements

1. Chemical or Product Identity
2. Hazard statement(s)
3. Precautionary statement(s)
4. Signal word
5. Pictogram(s)
6. Supplier identification

Below is a sample label.

SAMPLE LABEL

CODE _____ Product Name _____	} Product Identifier	Hazard Pictograms 	
Company Name _____ Street Address _____ City _____ State _____ Postal Code _____ Country _____ Emergency Phone Number _____	} Supplier Identification		
<p>Keep container tightly closed. Store in a cool, well-ventilated place that is locked. Keep away from heat/sparks/open flame. No smoking. Only use non-sparking tools. Use explosion-proof electrical equipment. Take precautionary measures against static discharge. Ground and bond container and receiving equipment. Do not breathe vapors. Wear protective gloves. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Dispose of in accordance with local, regional, national, international regulations as specified.</p> <p>In Case of Fire: use dry chemical (BC) or Carbon Dioxide (CO₂) fire extinguisher to extinguish.</p> <p>First Aid If exposed call Poison Center. If on skin (or hair): Take off immediately any contaminated clothing. Rinse skin with water.</p>		Signal Word Danger	
		Highly flammable liquid and vapor. May cause liver and kidney damage.	} Hazard Statements
		Precautionary Statements	
		Supplemental Information	
		Directions for Use _____ _____	
		Fill weight: _____ Lot Number: _____ Gross weight: _____ Fill Date: _____ Expiration Date: _____	

Labels or other forms of warning must be legible, in English, and prominently displayed on the container. Existing labels on incoming containers must not be removed or defaced unless the container is immediately marked with the required information.

B. Transfer Labeling

Secondary or "transfer" containers must be labeled if the Chemical will not be used within one work shift or if the container will not be constantly attended and under the immediate control of the user. Labeling secondary containers is considered to be best practice. And this practice can eliminate confusion and ensure that the container content is known in the event of an emergency. Secondary container labeling must include the name of the substance and hazard warnings at minimum.

C. Chemical Transfer Piping

Work activities are often performed in areas where Chemicals are transferred through pipes. These pipes are not required to be labeled; however, the employee needs to be aware of potential hazards. Prior to starting work in areas having unlabeled pipes, the employee should contact his/her supervisor to determine:

- The identity of the Chemical in the pipes,
- The potential hazards of the Chemical
- Necessary safety precautions to be taken to protect the employee

D. Placarding













The National Fire Protection Association (NFPA) developed a standard labeling system (**Placards**) to be able to readily recognize and easily understand markings which, at a glance, will give a general idea of the inherent hazards of any material and the order of severity of these hazards as they relate to fire prevention, exposure, and control. The system identifies the hazards of a material in terms of three categories: Health (blue),

Flammability (red), and Reactivity (yellow). The order of severity in each of these categories range from “4”, indicating a severe hazard, to “0” indicating no significant hazard.

Every Department shall complete a Chemical/gas inventory and an assessment of placard necessity – contact LU EHS for guidance. The inventory shall be updated periodically to reflect changes.

NFPA Hazardous Material Placards shall be posted where Hazardous Materials are easily and quickly identified by Emergency Personnel when incidents require such identification. LU EHS will assist in obtaining and posting of appropriate NFPA door placards.

VII. Chemical Handling and Storage

								
Flammable liquids	Acids	Bases	Oxidizers	Toxics	Compressed gases	Poison Inhalation	Water reactive	Liquid nitrogen
Do not store with acids or oxidizers Only store in refrigerators rated for flammables Keep quantities to a minimum (no 5 gallon cans permitted) Amounts over two(2) gallons: Store in an approved flammable cabinet	Do not store with bases, flammables, or cyanides Do not store under the sink	Do not store with acids May be kept with flammable liquids if in secondary containment	Do not store with flammable liquids or solids Do not store under the sink Avoid storage on wooden shelves	 And other Health Hazards Store on sturdy shelves below eye level or in secured cabinets Store separate from other hazard classes	Secure at all times even when empty Store away from heat sources Store with cap when regulator is removed Incompatible gases must be separated by a 30 minute fire barrier or 20 feet or line of sight	Store in a vented gas cabinet or a chemical fume hood Secure at all times Store with cap or plug in place	Do not store under the sink Store away from aqueous solutions Keep separate from other hazard classes	Store in a well ventilated area Consult EHS before storing 240L tanks
Examples Acetone Methanol Ether Hexane	Examples Sulfuric acid Hydrochloric acid Nitric acid Acetic acid	Examples Sodium hydroxide Potassium hydroxide Bleach	Examples Silver nitrate Ammonium persulfate Sodium periodate	Examples Sodium cyanide Sodium azide Aniline Ethidium bromide	Examples Helium Nitrogen Oxygen Hydrogen	Examples Carbon monoxide Chlorine gas Ethylene oxide Ammonia gas	Examples Sodium borohydride Hydrazine Sodium metal Phosphorus	Example LN
Special circumstances Combustible liquids (i.e. toluene) can be stored in the flammable cabinet if there is room.	Special circumstances Some acids are flammable (i.e. acetic acid) but still store them with the acids.	Special circumstances Some bases are flammable (i.e. ethanol amine) but still store them with the bases.	Special circumstances Some acids are oxidizers (i.e. nitric acid) but still store them with the acids.	Special circumstances Inspect containers regularly.	Special circumstances Container volumes less than 5 liters (i.e. lecture bottles) can be stored lying down.	Special circumstances Consult with EHS when storing or using these materials.	Special circumstances There may be enough moisture in the air to react these materials. Use caution.	Special circumstances Liquid nitrogen tanks vent loudly periodically. Do not be concerned.

All Chemicals are, to some degree, poisonous to the human body. Routes of entry include inhalation, skin and eye absorption, ingestion, and injection. Proper Storage and safe Handling of Chemicals, which minimizes the risk of fires and accidental spills, should include the following:

- Chemicals shall be stored in approved closed containers and cabinets with secondary containment to prevent releases, separated by compatible hazard class (flammable/oxidizers/acids/bases/reactives) to avoid unwanted reactions and unnecessary exposure to occupants.
- Whenever possible, protective coated Chemical bottles and glassware shall be purchased and used to reduce hazardous spills due to breakage.
- It is important to note that certain hazardous materials are not permitted in many of our campus buildings, since the facilities are not constructed for

high hazard use. Such materials include highly toxic gases, pyrophorics and highly reactive or unstable compounds and radioactive materials. LU EHS shall be consulted before any of these substances are brought onto Campus and MUST be approved by Environmental Health & Safety, as well as Risk Management prior to purchase or acquisition.

- Flammable, volatile Chemicals shall be kept in a cool place, away from sources of heat and ignition. If flammables are stored in refrigerators/freezers, the units shall be designed, manufactured and UL-approved to have spark-free interiors.
- Flammable liquids stored outside of an approved cabinet in an emergency exit path are **strictly prohibited**.
- **Any refrigerator or freezer not designed for the storage of flammables needs to have “EXPLOSION HAZARD: Do Not Store Flammables in This Refrigerator” marked on the outside of the door.** Also, no food is to be stored in the same refrigerator as Chemicals, film, or batteries. Hazardous substances can be absorbed by the food and subsequently ingested by individuals.

The total volume of flammable solvents in the laboratory shall be limited to the amount needed for approximately one week of operations or the limit prescribed by NFPA (National Fire Protection Association), UBC (Uniform Building Code), and UFC (Uniform Fire Code), whichever is more restrictive.

Additionally:

- Chemicals must be stored in secured areas, i.e., not accessible to the general public. Highly toxic and reactive materials need additional means of security such as lockable cabinets.
- All **Corrosives** (not only acids, but anhydrides and elemental iodine and others with the “corrosive” label on the original bottle) must be contained in corrosive cabinets. Additionally, parafilm should be placed over the cap of the original container to contain these Chemicals. **Corrosive Chemicals** should be stored in safety-coated containers on shelves below eye level. This storage strategy helps prevent splashes of chemicals to the face and eyes in case a container is dropped and broken. Acids and bases must be stored in their proper chemical classes and segregated from other incompatible chemicals
- All personnel shall be properly trained in use and application of SDS – knowledge of properties, reactivity’s and compatibilities of Chemical constituents, proper design and use of apparatus, engineering controls and correct PPE.

- All Chemicals shall be dated upon receipt and again upon opening. It is especially important that this procedure be done for all reactive and peroxide formers such as ethyl ether, tetrahydrofuran, etc. A first-in, first out (FIFO) inventory system shall be adopted to control excess accumulation of Chemicals and to prevent expired Chemicals from automatically becoming regulated hazard wastes
- All users of hazardous materials are required by EPA law to recycle Chemicals, Departments should consider the purchase of less toxic materials, or use smaller quantities and design procedures that reduce the volume and concentration of hazardous materials used and waste generated
- All Chemicals shall be stored in closed containers compatible with the Chemical inside. Chemicals shall be returned to their proper storage place immediately after use. Chemicals shall only be used with proper controls in place, (e.g., spill containment, protective shielding, ventilation, personal protective equipment, etc.). Chemical access and transportation shall be limited to authorized personnel
- Proper grounding procedures shall be used when transferring flammable liquids from one container to another, including distillation apparatus. Drums from which flammables are dispensed shall be grounded
- **Hydrofluoric Acid, Perchlorates, Perchloric Acid, Radioactive Materials, Pyrophorics**, gases and other extremely toxic, reactive, or potentially explosive materials shall be handled under the direct supervision of the instructor or research staff and only after consultation with LU EHS and approved by EHS and Risk Management.
- Also, the use of perchloric acid may require a specially designed and designated fume hood. A special license must be obtained, and a training course completed before any radioactive materials may be used. All radioactive materials must be approved by EHS & Risk Management prior to purchase or acquisition.
- Areas where hazardous or radioactive materials are used or stored must be thoroughly decontaminated using LU EHS approved methods prior to maintenance, renovation, reallocation of space, or closure. It is the responsibility of the supervisor, principal investigator, and their department to arrange proper disposal of all hazardous materials prior to personnel relocations or facility closure.
- **Transporting hazardous materials** in vehicles involves extensive training for compliance with Federal, State, and local regulations. **Contact LU EHS for details before attempting transportation and to assure compliance with the law.**
- Ensure basic precautions are taken for working with reactive materials, peroxides, and other high hazard Chemicals

- All Chemical work shall be below the permissible exposure limit (PEL) for OSHA-regulated substances, or the threshold limit value (TLV) provided by a ventilation system.
- Properly label all Chemical containers. Never use Chemicals from an unlabeled container. Provide secondary spill containment for all hazardous liquid Chemicals. Completely remove and destroy old labels before relabeling containers.
- All Chemicals, including those for disposal, must be clearly and completely labeled with full Chemical names in English. This will aid emergency personnel, lab users (especially where changes of personnel and lab renovations have occurred), waste program personnel, and other building occupants to identify hazards and handle or dispose of Chemicals properly.
- Use safety cans and approved Chemical cabinets for storage of flammable and volatile liquids. Establish **Hazardous Waste Satellite Accumulation Areas (SAAs)** and label receptacles for waste collection before beginning work. Properly dispose of waste. **NO HAZARDOUS CHEMICALS DOWN THE DRAIN.**
- **Nitric acid** should be stored away from other acids, especially organic acids.
- **All materials that exhibit more than one hazard should be stored in a cabinet rated for both hazards.**
- Separate storage areas must be provided for chemicals that may react with each other and create a hazardous condition
- Understand the concept of separating chemicals into compatible chemical groups. They should be clearly labeled for the chemical group. However, in the case of volatile, incompatible chemicals, there is no substitute for segregation in **separate spaces**. Chemicals, such as ether and glacial acetic acid, can react violently in the presence of nitric acid in an enclosed cabinet. Know your chemical inventory and store your chemicals properly and safely
- **Carcinogens** must be stored in a designated area that is posted with the appropriate warning sign - "DANGER - CANCER HAZARD - AUTHORIZED PERSONNEL USE ONLY"
- **Highly toxic chemicals** (rating of 3 or 4 on the NFPA Health Scale) must be stored away from fire hazards, heat, and moisture, and be isolated from corrosive and reactive chemicals.
 - Access to the storage areas for highly toxic substances must be restricted
 - Highly toxic chemicals should be stored in unbreakable containers, or in unbreakable secondary containers

- Cylinders of highly toxic gases should be stored in gas cabinets designed for that purpose, or in a functioning laboratory fume hood designed to contain the accidental release of the cylinder contents
- **Inherently Unstable and Potentially Explosive / Shock Sensitive Chemicals**, which are susceptible to rapid decomposition or reaction can react alone, or with other substances in a violent manner, giving off heat and toxic gases or leading to an explosion. Reactions of these chemicals often accelerate out of control and may result in injuries or costly accidents; such Chemicals can exhibit and include:
 - Air, light, heat, mechanical shock, even water can cause decomposition of some highly reactive Chemicals and initiate an explosive reaction. Specialized procedures and control equipment are needed to work safely with most reactive chemicals
 - Two common types of reactive chemicals are water reactive and pyrophoric Chemicals
 - **Water reactive Chemicals** react violently with water. They may produce flammable hydrogen gas or give off large amounts of heat
 - **Pyrophoric Chemicals** can spontaneously ignite when exposed to oxygen or moisture in the air at/or below 130 Deg. F. They must be stored under water, mineral oil, or an inert dry atmosphere depending on the substance
 - Of particular concern, are Chemicals such as **Picric Acid** regarding its extreme explosive instability as moisture content is lost

In cases where you must work with reactive chemicals, always read, and understand the protocols for manipulating the Chemicals and managing any Chemical wastes appropriately

Cryogenics

Cryogenics deals with the behavior of materials at low temperatures. The principal hazards involved with the use of cryogenic liquids and systems are—direct physical contact, pressure build up in unvented spaces, fires, explosions, implosions, and asphyxiation. Cryogenic fluids exist at temperatures -100°F (- 60°C) to - 460°F (-266°C), low enough to damage body tissue. The hazard level is comparable to that of handling boiling water.

Eye protection (minimum of goggles and face shields) shall be worn at all times because the boiling fluids can splash into the eyes. Hand protection (pads, tongs, and loose fitting quickly removable insulated gloves) is required when handling containers or cold metal parts. Clothing, jewelry, or other items that are capable of trapping or holding a cryogenic fluid close to the body shall be avoided. Aprons and lab coats shall be used. In all cases of contact or splashing, immediately flood the areas and clothing with water (use warm water at 100° – 105°F, same remedy as frostbite).

Cryogenic gases have limited warning properties and even if they are not toxic, are capable of causing asphyxiation by displacing oxygen. This is particularly true where cryogenic fluids are used in confined areas. Consult LU EHS to determine if ventilation is adequate. Since cryo-fluids exist at temperatures far below ambient, they vaporize with a volume increase of 700 – 800 times and can cause rapid and violent pressure changes if confined. Therefore, containers and equipment must be vented.

Avoid contact of moisture with storage containers and equipment because it can freeze and plug up pressure relief devices.

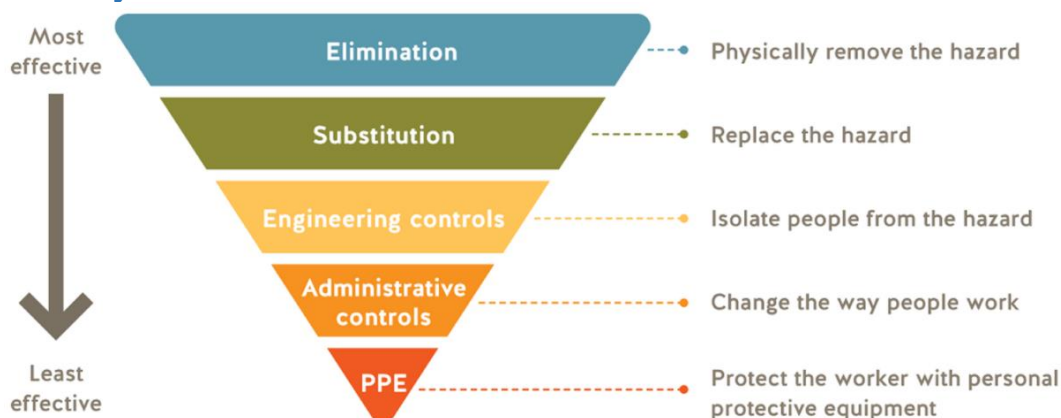
Never use an ordinary household Thermos bottle for cryogenic service. Explosions have occurred when liquid or cold gas finds its way into the outer vessel at the mouth, which is not adequately sealed from the inner vessel. Use special Dewar's designed for this purpose.

Combustible cryogens such as liquid hydrogen (LH₂) and liquid natural gas (LNG) must be handled with the same precautions as flammable gases. These precautions shall include proper grounding, local exhaust ventilation, keeping away from open flames and electrical ignition sources, no smoking, and the discharge of vent gases to a safe location. Liquid hydrogen can condense and solidify air into an air/H₂ mixture which is an explosion hazard because of the presence of both oxygen and hydrogen. Closed or flame-arrested hydrogen systems shall be used to prevent backflow of air and resulting explosion hazards.

Extreme care shall be observed when moving cryogenic storage containers. Avoid rolling them by holding the neck, as it is the main support for the inner portion of the container and is very susceptible to damage. Always use hand trucks for moving cryogenic containers unless container is on fixed wheels. Extreme cold can drastically alter the basic properties of many materials. Select equipment designed for use with cryogenics. **Never put cryogenic containers on an elevator while occupied.** If using an elevator, the product must be put inside the unoccupied elevator, must be able to go directly to the floor where needed without stopping and another person must be at the elevator door of the receiving floor. **Never let elevator doors close when a cryogenic container and a person(s) are in the elevator.**

COMPATABILITY

V. Hierarchy of Controls



The **Hierarchy of Controls**, or preferred order of controls, shall be used to choose methods to eliminate or control Chemical hazards. The best way to control hazards are to remove them completely from the workplace, rather than relying on employees to reduce their exposure. Methods that may be used to protect employees (listed from most effective to least effective) are:

- Substitution often involves advanced planning to eliminate hazards through potential component, method, or material changes.
- Engineering controls such as Chemical fume hoods, physically separate the employee from the hazard.
- Administrative controls, such as employee scheduling, are established by management to help minimize exposure time to hazardous Chemicals.
- Work practices are procedures which set a prescribed way to minimize or eliminate hazards.
- PPE. Personal protective equipment and protective clothing are used when no other control method is possible and is normally the last resort.

***Note: Where even PPE will not protect a worker from the hazard and no other control is possible, all related work shall be STOPPED, and Supervision shall engage the CHO (if applicable) and LU EHS to determine possible solutions.**

Chemical Fume Hoods, Special Exhaust and Air Handling Equipment

* For specifics regarding Fume Hood operation and requirements refer to the [Liberty University Laboratory Safety Program](#).

VI. Chemical Release

OSHA mandates engineering and work practice controls be used to reduce employee exposure to a level below the permissible exposure limit (PEL). Respiratory protection is to be used only as an interim measure or when engineering or work practice controls are infeasible.

Hazardous material releases can be minimized by implementing proper controls such as: appropriate storage, secondary containment, safety cans, ventilated cabinets, carrying devices, etc.

If an accident involving hazardous materials occurs which you know poses no immediate health concerns or danger of personal injury, try to keep the contaminant from spreading into the environment or entering drains by containing it with absorbent material. If the potential for personal danger does exist, secure the area, and leave immediately, evacuate others from the dangerous area and notify LUPD by calling 434-592-3911. **Under no circumstances shall a person reenter the area where a hazardous spill has occurred or where the possibility of personal danger exists.**

A. Spills

Instructors and student workers should be able to:

- Demonstrate proper techniques for cleaning up incidental (small or minor) spills.
- Demonstrate the appropriate use of PPE in responding to a minor Chemical spill.
- Demonstrate the proper use of a spill kit in response to a minor acid, base, or organic spill in the laboratory.
- Describe the appropriate action to take in the case of a large (or major) Chemical spill.

B. Chemical Waste

All **Chemical Hazardous Waste** must be disposed of by the appropriate methods. The below information will provide guidance on this important topic.

- Order only the quantity of Chemicals needed
- Actively manage Chemical inventory to ensure all containers are in good shape showing no signs of leakage, properly labeled, and have not expired
- Dispose of Chemical waste in a timely manner
- Do not allow full containers of Chemical waste to be stored in your area longer than two weeks
- Prior to leaving the university, ensure all Chemical waste has been removed
- If you are moving from one laboratory to another laboratory location, take the time to reduce the volume of materials to be taken to the new lab space
- Substitute non-hazardous or less hazardous Chemicals and/or modify your process to use smaller quantities of hazardous Chemicals whenever possible
- Utilize good housekeeping practices to minimize the risk of a spill

- If only a small amount of a particular Chemical is needed, consider obtaining the material from another campus Lab
- Waste must be stored according to chemical compatibility in proper storage cabinets

Special Waste

- Chlorinated solvents must be in glass containers
- Peroxide forming compounds (e.g., diethyl ether, 1,4-dioxane, tetrahydrofuran) must have a date of receipt and opening of container written on the container. The maximum storage period must not have expired. This is generally six months.
- Avoid generating Unknown waste by keeping good records of the waste you produce
- Explosive waste is handled on a case-by-case basis. Avoid generating this waste by diligently observing the expiration dates on chemical labels. Contact LU EHS
- Biological waste should be properly disposed of per current methods
- Asbestos waste and abatement are managed by LU EHS
- Radioactive waste is also handled by LU EHS
- For Pickup of Contained gas (cylinders, lecture bottles, etc.), arrangements should be made with the supplier for the removal of the containers at the time of purchase

VII. Emergency Requirements for Chemical Safety

If a Chemical is splashed in the eyes, the eyes must be continuously washed for a minimum of fifteen (15) minutes with running water.

- Safety showers and eyewashes shall be located within 75 feet of Chemical hazards (20 feet if strong acids or bases are used).
- Eyewashes shall be activated at least weekly by laboratory or LU EHS personnel to flush contaminants and verify proper operation.
- Any Chemicals splashed on the skin shall be rinsed off with plenty of fresh water. Escort the victim to the Student Health and Wellness Center for care after flushing the victim's eyes or skin or call LUPD at 592-3911 for medical assistance.
- Bring the SDS for the Chemical to which individual was exposed with you.

Know routes of escape in case of fire or other emergencies. Know the locations and types of available fire extinguishers. Know the location of the nearest AED. Know the location of the nearest available telephone and emergency number. This information shall be posted as part of your **Emergency Action Plan** in the CHP.

VIII. Emergency and First Aid

A. Emergency Response

- All Affected employees shall be able to describe procedures related to providing first aid for Chemical accidents. This also includes specifics described in the Laboratory CHP
- All Affected employees shall be able to demonstrate basic first aid procedures for common minor Chemical accidents.
- All Affected employees shall be able to demonstrate the proper use of a safety shower and an eyewash station.
- All Affected employees shall be able to describe emergency exit procedures and specific locations of emergency equipment.
- All Affected employees shall be able to describe participation in an emergency exit procedure.

B. Fires

- All Affected employees shall be trained to describe the components of the fire triangle and the fire tetrahedron.
- All Affected employees shall be trained to describe the classes of fires and the appropriate class and use of fire extinguishers for each class of fire.
- All Affected employees shall be trained to describe the result of flammable vapors catching fire and expanding according to the gas equation.
- All Affected employees shall be trained to know when to use a fire extinguisher and when to evacuate and what the proper fire escape routes and assembly areas are for the laboratory or peripheral room in which they are working.

IX. Training

All Affected LU employees, including LU Laboratory Workers, shall be trained, at minimum, in OSHA HAZCOM (Right to Know) awareness, and the specifics of this Chemical Safety Program, which should meet GHS (Globally Harmonized Systems) requirements for formatting of SDS documents and interpretation of them. Contact LU EHS for guidance regarding such training.

Chemical Safety Training must also include:

- The existence and availability of the HAZCOM Plan or Chemical Hygiene Plan and requirements of the Liberty University Laboratory Safety Program, if applicable, based on OSHA 29 CFR 1910.1450.
- The components of the HAZCOM Plan or CHP that outline specific procedures including SOPs, engineering controls, and required Personal Protective Equipment.
- Permissible Exposure Limits (PEL) for regulated substances and the recommended exposure limits for other hazardous Chemicals where no OSHA standard applies.

- Signs and symptoms of exposure to hazardous Chemicals.
- Location and availability of Safety Data Sheets (SDSs) which convey the hazards, safe handling, storage, and disposal of hazardous Chemicals in the workplace.
- Retraining shall be accomplished for any instructor, or laboratory worker where evidence of insufficient training exists, or new equipment, procedures, or new Chemicals or substances are introduced into the laboratory.

X. Applicable Regulations and Documents

<u>Item</u>	<u>Document # or Reference Material</u>	<u>Title</u>	<u>Location</u>
1.	OSHA 29CFR 1910.1450 Appendix A	OSHA National Research Council Recommendations Concerning Chemical Hygiene in Laboratories (Non-Mandatory)	https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10107
2.	OSHA 29CFR 1910.1200	OSHA HAZCOM Standard, including GHS requirements	1910.1200 - Hazard Communication. Occupational Safety and Health Administration (osha.gov)
3.	Liberty University Laboratory Safety Program	Liberty University Laboratory Safety Program	https://www.liberty.edu/security-public-safety/environmental-health-safety/policies-programs-procedures/
4.	Liberty University Hazard Communication Program	Liberty University Hazard Communication (HAZCOM) Program	https://www.liberty.edu/security-public-safety/environmental-health-safety/policies-programs-procedures/

Revision Tracking

Revision Number	Revision Description	Revision Location	Date Originated or Revised	Program Author or Revisor/ Reviewer	Program Approver
	Original		11/7/2022	Bob Drane – A Greg Bennett - R	Ronald Sloan John Peterson Greg Bennett

APPENDIX: A HazCom Plan Checklist and Annual Review
 (Available on the [EHS Website](#) under
 Environmental Health & Safety Forms)

HazCom Plan Checklist and Annual Review

WORK AREA LOCATION AND RESPONSIBLE PARTY

In accordance with Liberty University Written Hazard Communication Program (available online on the [LU EHS Web page](#), this HazCom Plan has been prepared for:

Name of Department:	
PI/Supervisor:	
Building/Room #(s):	

HAZCOM COORDINATOR

A Hazard Communication Coordinator or designee has been identified for this workspace.

Name:	
Phone Number:	
E-mail:	
Office Location:	

HAZCOM PLAN

The HazCom Plan consists of a (1) Chemical Inventory and (2) Safety Data Sheets in addition to the following area-specific information related to chemical hazards and emergency response. A hard copy of this completed workplace-specific documentation must be maintained in a binder or folder in a designated location with Safety Data Sheets and the Chemical Inventory, where it can be accessed quickly in an emergency and/or used for lab-specific training.

Hazardous Chemical Inventory/List for this workplace has been prepared. The Hazard Communication Coordinator is responsible for updating and managing the list.

Location of Chemical Inventory/List:	
--------------------------------------	--

Safety Data Sheets for all chemicals (current versions) have been compiled.

Primary SDS Location:	
Back-up SDS Location:	

Note: Safety Data Sheets (SDS's) must be readily accessible (no barriers to student or employee access) to personnel working in the lab. In addition to the primary location of SDS's, a back-up SDS management system must be available in the event of an emergency (including power outages, equipment failure, on-line access delays, etc.)

****Important:** When possible, always provide responders (local hospital and rescue squad) with hard copies of SDS(s) as it will greatly assist them in responding quickly to your lab's emergency.**

NON-ROUTINE TASKS

- Non-routine tasks and their hazards have been identified, and controls to minimize exposure are described below.

PERSONNEL TRAINING

- Personnel have been informed about the labeling system(s) used in this space to communicate chemical hazards (NFPA, HMIS, or other).

Unless otherwise specified below, the chemical/product name and any primary hazard word will be marked on secondary container.

- All personnel are work-area chemicals/chemical products have completed on-line training and received workplace-specific training from the HazCom coordinator.
- All personnel are entered in the Safety Management System for this work area, and their training has been recorded.

ANNUAL UPDATE/REVISIONS/REVIEW

- Review the HazCom Plan contents annually. Record the annual review below.

Date	Revision #	Comments	Signature

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