Environmental Health & Safety

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Chemical Hygiene Plan

EH&S Program Contacts

Subject	Office Name	Telephone	Email
Laboratory Safety	Chemical Hygiene Officer	940-565-3282	Claire.Welton@unt.edu
Laboratory Safety	Biological Safety Specialist	940-369-8513	Jordan.Murray@unt.edu
Laboratory Safety	Radiation Safety Officer/ Laboratory Safety Program Manager	940-565-4196	Todd.Germain@unt.edu
Environmental Compliance	Environmental Compliance Specialist	940-565-2123	Anthony.Roman@unt.edu
Environmental Compliance	Environmental Program Manager	940-369-8055	Narender.Byru@unt.edu
Occupational Safety	Occupational Safety Program Manger	940-369-8146	Steven.Wilson2@unt.edu
Occupational Safety	Occupational Safety Specialist	940-369-8790	Bradley.Prince@unt.edu
Occupational Safety	Registered Sanitarian/ Occupational Safety Specialist	940-369-8125	Vriana.Washington@unt.edu
Environmental Health & Safety	Director	940-565-2167	Chris.Erickson@unt.edu
Risk Management Services	Department Main Line	940-565-2109	AskRMS@unt.edu

Emergency Phone Numbers

Police/Fire/Health/Spill Emergency	Police Dispatch	911
Police/Spill Non-Emergency	Police Dispatch	940-565-3000
Hazardous Material Exposure Non-Emergency	Risk Management	940-565-2109
Emergency Power Outage	Facilities	940-565-2700

Other Important Institutional Phone Numbers

Research Integrity and Compliance	940-565-4643
UNT Trust Line	1-877-606-9187

RECORD OF CHANGES

Date of Change	Change Entered By	Description
11/3/2026	**Claire Welton**	**This is the first version of a new Chemical Hygiene Plan generated in 2026. This document has been updated to better reflect UNT's current program.**

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1. INTRODUCTION

The University of North Texas (UNT) is committed to providing a safe and healthy working environment for students and employees.

The Chemical Hygiene Plan (CHP) is a mandatory, written program outlining policies, procedures, equipment, and training to protect members of the University from health hazards associated with hazardous chemicals. It was developed to manage and mitigate risks associated with the use of hazardous chemicals and serves as the foundation of UNT's laboratory safety program. The CHP should be made available to all.

All members of the University, including Principal Investigators, Laboratory Supervisors, employees, and students, have a duty to maintain a safe work environment. Safety is everyone's responsibility and should be everyone's priority.

1.1 PURPOSE

The purpose of the CHP is to provide personnel with general minimum standards for implementing a high-quality chemical safety program. It is not an exhaustive source document but rather a basis to which supervisors shall add safety measures relevant to their laboratory or work areas.

This information and procedures listed in this manual will assist members of the University in fulfilling their responsibilities to ensure a safe and healthy environment at UNT.

1.2 OBJECTIVES

Through adherence with state and federal occupational health and safety standards, risks arising from the use of hazardous chemicals can be greatly reduced or eliminated. UNT's CHP was created in reference to the Texas Hazard Communication Act, the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, and the OSHA Occupational Exposure to Hazardous Chemicals in Laboratories Standard.

The CHP shall be reviewed at least annually for its effectiveness and updated as necessary. Ongoing dialogue and feedback are encouraged to support continuous improvement.

1.3 SCOPE

The CHP is part of the Environmental Health and Safety (EH&S) Policy 15.018, and it applies to all areas of UNT and all members of the University engaged in the use, handling, or storage of hazardous chemicals. Hazardous chemicals are chemicals which have been classified as a health hazard or simple asphyxiant in accordance with the Occupational Safety and Health Administration Hazard Communication Standard.

This is primarily an in-house manual. The procedures and requirements are established based on the facilities and resources available. They represent, nonetheless, a code of standard safe work practices.

2. ROLES & RESPONSIBILITIES

All personnel have the responsibility to maintain a safe working environment.

2.1 CHEMICAL HYGIENE OFFICER

The Chemical Hygiene Officer is responsible for the following:

- Providing technical guidance in the development and implementation of the CHP and reviewing at least annually
- Providing general safety trainings
- Providing supervisors with safety door sign templates
- Conducting annual safety surveys of applicable locations where hazardous chemicals are used and stored
- Providing technical guidance and investigation, as appropriate, for incidents, injuries, and near misses involving hazardous chemicals
- Verifying the face velocity of fume hoods
- Providing technical guidance, assistance, information, and instruction on the safe use and disposal of hazardous chemicals
- Assisting administration and other employees develop and implement appropriate chemical hygiene policies and practices

2.2 SUPERVISORS AND MANAGERS

Supervisors at all levels throughout the university are responsible for maintaining a safe and healthy workplace. They shall ensure compliance with all applicable safety and health standards, rules, and regulations pertaining to the activities immediately under their authority. Supervisors must ensure that all personnel who report to them complete required training prior to initiation of work. In fulfilling these responsibilities, EH&S may be called upon for assistance as needed.

2.2.1 PRINCIPAL INVESTIGATORS

Principal Investigators (PIs) are responsible for the health and safety of all personnel working in their laboratory. The PI may delegate safety duties, but they remain responsible for ensuring that any delegations are adequately performed. The PI has the primary responsibility of establishing a strong safety culture within the laboratory they oversee. New PIs must contact UNT Risk Management Services (RMS) prior to beginning their laboratory operations. RMS should also be contacted by PIs moving into

a new lab and before vacating or closing a laboratory. The PI is responsible for the following:

- Following all applicable health and safety rules, regulations, and requirements
- Ensuring safety door signs are representative of all relevant hazards and contain current emergency contact information
- Ensuring potential hazards have been identified, minimized, and addressed through the completion of risk assessments and implementation of appropriate controls prior to initiation of work
- Identifying and providing necessary safety supplies (e.g., spill kits, first aid kits, etc.) and personal protective equipment (e.g., laboratory coats, gloves, eye protection, etc.) to all laboratory personnel
- Maintaining the availability and functionality of personal protective equipment and training laboratory personnel on the proper selection, use, and maintenance of personal protective equipment
- Enforcing safe work practices and use of personal protective equipment in the laboratory
- Ensuring that laboratory personnel comply with the CHP and have completed required training
- Developing and implementing standard operating procedures (general and protocol specific, chemical and process) and training programs specific to the work conducted in their laboratories
- Providing initial and annual training regarding lab-specific hazards and maintaining documentation of initial and annual training for all lab personnel
- Maintaining an up-to-date and accurate chemical inventory of all hazardous materials for the laboratory with safety data sheets readily accessible
- Promptly notifying RMS and/or Facilities Management if workplace engineering controls (e.g., fume hoods) and safety equipment (e.g., emergency showers/eyewashes, fire extinguishers, etc.) become non-operational
- Ensuring all injuries, spills, incidents, and near-misses are reported to RMS as soon as possible and within 24 hours
- Investigating laboratory incidents, identifying root causes, and implementing appropriate solutions in collaboration with EH&S personnel
- Actively participating in safety improvement efforts, including the annual safety survey
- Continuously monitoring the laboratory to identify and correct unsafe conditions
- Mitigating hazards and ensuring lab specific personal protective equipment is provided for non-laboratory personnel (e.g., custodians, facilities, maintenance, IT) entering the laboratory

- Leaving facilities and equipment in a clean and safe condition when the premises are vacated and following all laboratory closure procedures

2.2.2 LABORATORY SUPERVISORS

Laboratory Supervisors oversee spaces where hazardous chemicals are used or stored, including but not limited to research, teaching, and stockroom spaces. Laboratory Supervisors may delegate safety duties, but they remain responsible for ensuring that any delegations are adequately performed. The Laboratory Supervisor has the primary responsibility of establishing a strong safety culture within the laboratory they oversee. If the Laboratory Supervisor oversees a teaching laboratory, the responsibilities below are designated for both the Instructor of Record and the Laboratory Supervisor. Laboratory Supervisors are responsible for the following:

- Following all applicable health and safety rules, regulations, and requirements
- Ensuring safety door signs are representative of all relevant hazards and contain current emergency contact information
- Ensuring potential hazards have been identified, minimized, and addressed through the completion of risk assessments and implementation of appropriate controls prior to initiation of work
- Identifying and providing necessary safety supplies (e.g., spill kits, first aid kits, etc.) and personal protective equipment (e.g., laboratory coats, gloves, eye protection, etc.) to all laboratory personnel
- Maintaining the availability and functionality of personal protective equipment and training laboratory personnel on the proper selection, use, and maintenance of personal protective equipment
- Enforcing safe work practices and use of personal protective equipment in the laboratory
- Ensuring that laboratory personnel comply with the CHP and have completed required training
- Developing and implementing standard operating procedures (general and protocol specific, chemical and process) and training programs specific to the work conducted in their laboratories
- Providing initial and annual training regarding lab-specific hazards and maintaining documentation of initial and annual training for all lab personnel
- Maintaining an up-to-date and accurate chemical inventory of all hazardous materials for the laboratory with safety data sheets readily accessible
- Promptly notifying RMS and/or Facilities Management if workplace engineering controls (e.g., fume hoods) and safety equipment (e.g., emergency showers/eyewashes, fire extinguishers, etc.) become non-operational

- Ensuring all injuries, spills, incidents, and near-misses are reported to RMS as soon as possible and within 24 hours
- Investigating laboratory incidents, identifying root causes, and implementing appropriate solutions in collaboration with EH&S personnel
- Actively participating in safety improvement efforts, including the annual safety survey
- Continuously monitoring the laboratory to identify and correct unsafe conditions
- Mitigate hazards and ensure lab specific personal protective equipment is provided for non-laboratory personnel (e.g., custodians, facilities, maintenance, IT) entering the laboratory
- Leaving facilities and equipment in a clean and safe condition when the premises are vacated and following all laboratory closure procedures

2.3 EMPLOYEES

Employees at all levels throughout the University are responsible for complying with all health and safety standards and rules regarding activities in their work area. Employees have the responsibility to ensure that they complete all assigned workplace training prior to initiation of work. Everyone must take all necessary and appropriate safety precautions to protect themselves, other personnel, and the environment.

2.3.1 LABORATORY PERSONNEL

Laboratory personnel (e.g., undergraduate researchers, graduate researchers, post-doctoral researchers, staff scientists, student workers, teaching assistants, and all students in a laboratory setting) are responsible for the following:

- Reviewing and following the requirements of the CHP
- Completing all required safety trainings prior to initiation of work
- Understanding and following all laboratory safety rules, regulations, standard operating procedures, and best practices
- Utilizing appropriate measures to manage identified hazards, including consistent and proper use of engineering controls, personal protective equipment, and administrative controls
- Understanding the capabilities and limitations of personal protective equipment, wearing proper attire, and wearing all required personal protective equipment
- Reporting all incidents, injuries, illnesses, spills, near-misses, and unsafe conditions and work practices to the PI and/or Laboratory Supervisor and RMS as soon as possible and within 24 hours
- Following all procedures for working alone

- Properly identifying, labeling, handling, storing, and disposing of hazardous waste
- Leaving facilities and equipment in a clean and safe condition when work has been completed

2.3.2 NON-LABORATORY PERSONNEL

Non-laboratory personnel (e.g., custodians, facilities, maintenance, IT) are responsible for the following:

- Reviewing and following laboratory safety signage
- Wearing proper attire and personal protective equipment for the hazards present
- Refraining from consuming food or drink, chewing gum, or applying cosmetics in the laboratory

3 EMERGENCIES, INCIDENTS, AND EXPOSURES

3.1 EMERGENCIES

Emergencies occur when there is an injury requiring medical attention, there is a real or potential danger to life, health, the environment, or property, and/or the hazard is not fully understood. If the hazard is such that more than just the lab needs to evacuate, pull the closest fire alarm in the building.

3.1.1 WHO TO CONTACT IN AN EMERGENCY

When in doubt, default to the highest response and call 911 in an emergency. Communication is critical in the onset of a crisis. If you have called in outside help (911, UNT Police Department, EH&S, etc.), you must tell the responders where to meet once they arrive. Responders will need to speak to those responsible for the space (PI, Laboratory Supervisor, shop manager, laboratory personnel, etc.) and those present at the onset of the problem.

Prepare for emergencies before they occur. Ensure that the emergency contacts on the UNT Safety Signage outlined in Section 9.1 remain up to date. Have your manager (PI or Laboratory Supervisor), main department, UNT Police Department, RMS, and any other pertinent phone numbers programmed into your phone's contact list. When an emergency occurs, use the following contact order:

- Call 911

- Call your manager (PI or Laboratory Supervisor); if they cannot be reached call the department
- Call the UNT Police Department at 940-565-3000
- Call RMS at 940-565-2109

3.2 EMERGENCY RESPONSE EQUIPMENT

3.2.1 SAFETY SHOWERS/EYEWASHES

Pursuant to the American National Standard Institute (ANSI) standard Z358.1, functional and verified safety showers and eye washes must be readily available to all laboratory personnel. These may be located directly in the laboratory or within the hallway corridor. Safety showers/eye washes must have at least 36" of clearance to allow immediate access and use at all times. Plumbed emergency eyewashes should be activated weekly to verify proper operation. EH&S performs annual testing and inspections of eyewashes and safety showers.

In the event of exposure to the body, remove contaminated clothing and flush the exposed area for 15 minutes.

In the event of exposure to the eyes, flush using an eye wash for 15 minutes. Once contaminated gloves have been removed and if your hands are clean, hold your eyes open in the stream of water. Consider having someone assist you with holding your eyes open. Gently roll the eyes up and down and left to right. If you have contacts, begin rinsing your eyes immediately. Remove the contacts and continue rinsing your eyes for an additional 15 minutes.

3.2.2 FIRE EXTINGUISHERS

The National Fire Protection Association (NFPA) 10 requires that a fire extinguisher be available, mounted, clearly labeled, and fully charged, complete with appropriate safety pins and seals. If the lab works with combustible metals or metal alloys, it is required to have a Class D fire extinguisher as Class ABC extinguishers cannot be used for combustible metal fires.

UNT Facilities Services performs annual inspections and monthly visual inspections. Contact UNT Risk Management Fire & Life Safety for more information on how to properly use a fire extinguisher.

3.2.3 FIRST-AID KITS

Pursuant to ANSI Z308.1, first-aid supplies should be readily accessible at all times and must be regularly maintained, including restocking and removing expired items.

3.2.4 SPILL KITS

To prevent injury to health, the environment, and/or property, all contiguous laboratory areas that utilize hazardous chemicals must have a chemical spill kit. The spill kit contents must include eye protection, gloves, hand broom and dustpan, container for spill cleanup waste, and materials capable of absorbing, neutralizing, and inactivating hazardous materials in the event of a spill. If you are unsure of the proper spill materials for the hazardous within your lab, contact EH&S for consultation. The location of the spill kit must be labeled and unobstructed. Spill kits should be readily accessible and all personnel working in the lab should know their location. Spill kits should also be checked regularly to make sure they are fully stocked and adequate for the work being done.

3.3 INCIDENTS

Incidents are events that result in personal injury, illness, and/or damage to property, equipment, materials, or the environment. Examples include, but are not limited to: acid burns, fires, and chemical releases requiring evacuation of at least the immediate spill area.

3.3.1 INCIDENT REPORTING

Incidents are required to be reported so that adequate response and remediation can be conducted. Report incidents on the Report an Issue page of the RMS website. Incidents should be reported as soon as possible and within 24 hours after the incident has been addressed and there is no immediate threat to life or health.

3.3.2 FIRES

For large fires, fires spreading quickly, or if you are uncomfortable attempting to put out the fire:

- Evacuate the area, isolating the fire as you exit by closing fume hood sashes, doors, etc.
- Pull the fire alarm
- Call 911 and then use the contact order in Section 3.1.1 Who to Contact in an Emergency

For small fires that do not pose an immediate risk to health and/or physical safety, you may extinguish the fire if you feel comfortable.

3.3.3 SPILLS

If for any reason you are not comfortable cleaning up a spill, isolate the incident and notify the PI or Laboratory Supervisor. If the spill is on the benchtop or floor, evacuate the lab. If the spill is in a fume hood or otherwise contained, there is no need to evacuate.

Do not attempt to clean spills of volatile chemicals as they can cause additional exposures as they evaporate. For spills of volatile chemicals, evacuate the laboratory, increasing ventilation as you exit, and contact the PI or Laboratory Supervisor.

For non-volatile spills, you may clean the spill if you are comfortable, aware of the hazards, and are in possession of the appropriate materials and personal protective equipment.

3.3.4 ALARMS

If an alarm or sensor is activated:

- If possible, note the type of alarm
- Evacuate, closing all doors and preventing re-entry
- Notify the PI or Laboratory Supervisor

3.3.5 INJURIES

For life-threatening injuries, call 911 and immediately go to the hospital.

For non-life-threatening injuries, such as small cuts and minor burns, you may administer first-aid if you are comfortable.

If you require further medical attention, students should go to the UNT Student Health and Wellness Center. Employees injured on the job must seek medical treatment at a workers' comp in-network provider. If an out of network primary care physician provides treatment, this will be at the expense of the injured employee and will not be covered by workers' compensation. If you are injured on the job, your supervisor should complete the Employee Injury Report, found on the Forms page under the "Insurance and Claims" heading of the RMS website.

3.3.6 NEAR MISSES

A near-miss is defined as a potential hazard or incident in which no personal injury was sustained and no property was damaged but given a slight shift in time or position, damage or injury could have occurred. Near misses are required to be reported as soon as possible and within 24 hours after the event has been resolved. Reporting near misses provides valuable information that can help identify hazards and implement corrective actions before an event results in injury or property damage.

Examples of near-miss incidents that must be reported include but are not limited to: a spill that caused no injury or damage that was cleaned by laboratory personnel, a compressed gas cylinder tipping or falling, and potential overexposures to chemical, biological, or physical agents that do not result in immediate symptoms.

Report near misses on the Report an Issue page of the RMS website.

3.4 EXPOSURES

3.4.1 SIGNS AND SYMPOTOMS OF EXPOSURES

Exposures from leaking or damaged chemical containers can be observed through residues and/or unusual odors. Exposures from mixtures of incompatible chemicals can be observed through smoke, fumes, bubbling, odors, etc. However, not all exposures are easily detected by the human senses. Review safety data sheets of chemicals prior to the initiation of work to familiarize yourself with their hazards and signs and symptoms of exposure. See Section 11 for more information about safety data sheets.

Exposures to hazardous chemicals can result in both acute and chronic physical symptoms. Acute symptoms of chemical exposures include burning or irritation, coughing, vomiting, drowsiness, dizziness, headache, rash, blurred vision, etc. Chronic symptoms of chemical exposures include organ damage, cancer, development of new allergies, infertility, etc. It is important to note both acute and chronic exposures can lead to injury or illness.

3.4.2 CHEMICAL EXPOSURE LIMITS

Permissible Exposure Limits (PELs): OSHA regulations establish PELs to limit worker exposures to hazardous chemicals. PELs are eight-hour time weighted average concentrations of contaminants in air to which a healthy person can be repeatedly exposed without reasonable expectation of adverse health effects. PELs are provided in the OSHA Toxic and Hazardous Substance Standard Table Z-1 and Table Z-2.

Recommended Exposure Limits (RELs): RELs are recommended by the National Institute for Occupational Safety and Health (NIOSH) in order to protect worker health. OSHA uses the NIOSH recommendations to develop legally enforceable standards. Therefore, PELs may be outdated and RELs should be considered and followed as a best practice. RELs are published in the NIOSH Pocket Guide to Chemical Hazards.

Threshold Limit Values (TLVs): TLVs are a reserved term of the American Conference of Governmental Industrial Hygienists (ACGIH). They refer to airborne concentrations of chemical substances under which it is believed that nearly all workers may be repeatedly exposed, day after day, over a working lifetime, without adverse health effects. A Threshold Limit Value-Time Weighted Average (TLV-TWA) is a time-weighted average concentration limit for a conventional 8-hour workday and a 40-hour workweek. A Threshold Limit Value–Short-Term Exposure Limit (TLV–STEL) is a time-weighted average concentration for a 15 minute exposure. A Threshold Limit Value–Ceiling (TLV–C) is a concentration that should not be exceeded during any part of the working

exposure. TLVs should be considered and followed as a best practice. TLVs are often found in safety data sheets.

3.4.3 CHEMICAL EXPOSURE MONITORING

Exposure monitoring is the determination of the airborne concentration of a hazardous material in the work environment. Any exposure to a hazardous chemical regulated in the OSHA Occupational Exposure to Hazardous Chemicals in Laboratories Standard that requires monitoring will be measured if there is reason to believe that exposure levels for that substance routinely exceed the action level (or in the absence of an action level, the PEL). If initial monitoring discloses employee exposure over the action level (or PEL), periodic monitoring will be conducted according to the relevant standard. Personnel shall be notified in writing of monitoring data within 15 days of receipt of those monitoring results. It is the PI/Laboratory Supervisor's responsibility to provide for the cost of exposure monitoring. Contact RMS for assistance coordinating chemical exposure monitoring.

3.4.4 MEDICAL EXAMINATIONS

Pursuant to the OSHA Occupational Exposure to Hazardous Chemicals in Laboratories Standard, all medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost, without loss of pay, and at a reasonable time and place. For non-emergencies, students should report to the UNT Student Health and Wellness Center for medical examinations and employees should report to a workers' comp in-network provider. Any personnel who work with hazardous chemicals have the opportunity to receive medical attention, including any follow-up examinations the examining physician determines to be necessary, under the following circumstances:

- Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory
- Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are medical surveillance requirements
- Whenever an event takes place in the work area such as a spill, leak, explosion, or other occurrence resulting in the likelihood of a hazardous exposure

4 RISK ASSESSMENTS

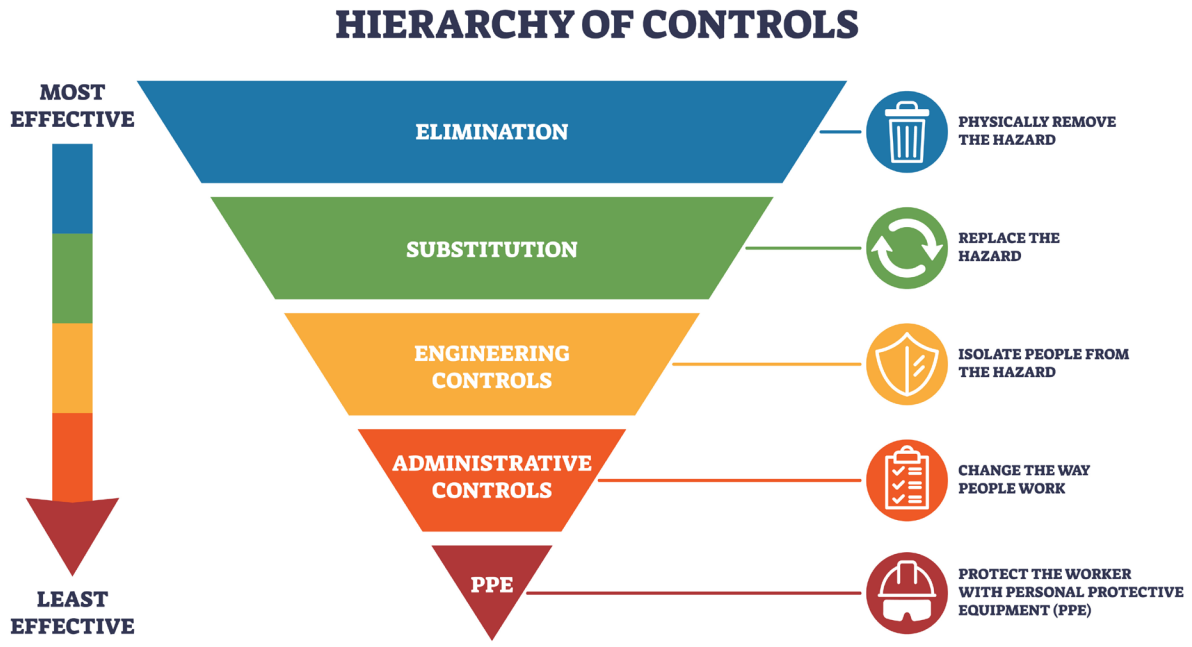
Risk assessment is the process of evaluating a workplace, process, activity, or work method to identify potential hazards and assess the risks associated with those hazards. After hazards are identified and the severity and likelihood of associated risks are evaluated, appropriate control

measures shall be implemented to eliminate the hazard or, when elimination is not feasible, reduce the risk to an acceptable level. The goal of a risk assessment is to identify, eliminate, or reduce hazards through the implementation of appropriate control measures. The control measures from the Hierarchy of Controls outlined in Section 5 should be used when conducting a risk assessment. See the UNT Occupational Safety Manual for more information about risk assessments.

5 HIERARCHY OF CONTROLS

The Hierarchy of Controls was developed by NIOSH as a tool to identify and rank hazard controls. In most cases, a combination of control methods should be used to minimize risks. Controls are arranged from most effective to least effective as follows:

- Elimination: Physically remove the hazard. Is the hazardous chemical or process necessary?
- Substitution: Replace the hazard. Is there a less hazardous chemical or process that would produce the same result? Consider the scale of the reaction.
- Engineering Controls: Isolate people from the hazard. Should the experiment be conducted in a fume hood, glove box, etc.?
- Administrative Controls: Change the way people work. Are there adequate training and standard operating procedures?
- PPE: Protect the worker with personal protective equipment. What type of gloves, eye protection, laboratory coat, clothing, etc. is appropriate to protect against the hazard?



Hierarchy of Controls

6 ENGINEERING CONTROLS

Inspect engineering controls before use to ensure they are functioning properly. Promptly report any engineering control that is not functioning properly to the supervisor and mark it as out of service until repairs can be completed.

6.1 FUME HOODS

A chemical fume hood is a safety device designed to limit exposure to hazardous or toxic fumes, vapors, mists, and particulate matter generated within the hood's interior. Use of a fume hood is required when working with volatile hazardous chemicals with a Threshold Limit Value (TLV) of less than 50 ppm.

Work at least 6 inches behind the fume hood sash, do not open the sash above 15 inches, and never allow your head to enter the plane of the sash. For example, for vertical rising sashes, keep the sash below your face; for horizontal sliding sashes, keep the sash positioned in front of you and work around the side of the sash.

Elevate equipment (e.g. a centrifuge) at least 2 inches off the base of the fume hood interior. Ensure that nothing blocks the airflow through the baffles or through the baffle exhaust slots. Do not permanently store any chemicals inside of the fume hood.

For any work involving heated perchloric acid (such as in perchloric acid digestions), the work must be conducted in a specific perchloric acid fume hood. Perchloric acid hoods are generally made of non-corrosive materials (stainless steel) and are equipped with a water wash down mechanism in the ductwork to prevent the formation of explosive perchlorates. Perchloric acid fume hoods must be clearly labeled and used only for perchloric acid or other mineral acids. No organic solvents should be stored or used in these hoods.



Fume Hood

6.1.1 FUME HOOD VERIFICATION PROGRAM

RMS performs an annual functional performance verification to ensure fume hoods perform as required. The performance verification includes an evaluation of the face velocity of the fume hood. RMS may also note any observed problems with the controls, sash, baffles, light, or corrosion. If the fume hood alarm goes off or there are other issues in between annual verifications, submit a work request to UNT Facilities Services and notify RMS. Additional verifications will be performed as requested.

Fume hoods must operate at a face velocity between 80 and 120 fpm (feet per minute) plus minus 10 fpm (70-130) as measured by RMS with an anemometer at a sash height of 15 inches. The verification will be conducted by taking the average face velocity of 3-9 samples, depending on fume hood size, at a minimum of 5 inches from the edge of the hood or sash. Fume hoods verified by RMS will have a label that records the last passing verification performed.

6.2 SNORKELS

A snorkel is a flexible fume exhaust duct connection. Protection drops off quickly from the face of the snorkel, so it needs to be placed less than 6 inches from the work area. Snorkels should only be used to exhaust heat and nuisance odors. They should never be used with highly toxic or flammable chemicals.



Snorkels

6.3 LAMINAR FLOW HOODS

A laminar flow hood is specifically used to protect the sample from airborne contaminants and offers no protection for the user in any way. Hazardous chemicals cannot be used in a laminar flow hood.



Laminar Flow Hood

6.4 GLOVE BOXES

A glove box is a sealed enclosure which allows users to perform operations in an atmosphere other than ambient. They protect individuals from hazardous materials and/or materials from air or moisture. All laboratory personnel must be trained by the PI, Laboratory Supervisor, or designated senior laboratory personnel on the specific vacuum, ventilation, and atmospheric controls of the glove box prior to performing any work.

Chemical resistant gloves (e.g., disposable nitrile gloves) should be used under the glove box gloves to protect from contamination. Remove jewelry to prevent glove tears. Gloves should not be used until they fail; they should be changed according to the glove box manufacturer's recommendations or whenever necessary. Plugging ports that are never or infrequently used is recommended. A properly plugged port should have a stub glove and a glove port cap installed.

All equipment and chemicals in the glove box must be organized, and all chemicals must be labeled. Sharps should be stored in an approved container within the glove box to reduce the risk of glove punctures. Do not allow items, particularly unused chemicals and wastes, to accumulate in the glove box.



Glove Box

7 ADMINISTRATIVE CONTROLS

Pursuant to the OSHA Hazard Communication Standard and Occupational Exposure to Hazardous Chemicals in Laboratories Standard, all personnel shall be trained in their work areas at the time of initial assignment and prior to work involving new exposure situations. Supervisors are responsible for identifying employees and students who require training and ensuring that those individuals are trained.

7.1 TRAINING

Links to enroll in trainings can be found on the RMS website. The following trainings are required:

Work Activity or Exposure	Required Training	Training Frequency
Works with hazardous chemicals in a lab on Main Campus	General Lab Safety Training	Before beginning work and annually thereafter
Is a paid employee, student worker, or volunteer conducting research at Discovery Park	Engineering Lab Safety Training	Before beginning work and annually thereafter
Works with chemical waste in labs and hazardous waste in other campus areas	Hazardous Waste Training, Engineering Lab Safety Training, or General Lab Safety Training	Before beginning work
Works with hazardous materials	Hazard Communication Standard Training, Engineering Lab Safety Training, or General Lab Safety Training	Before beginning work
Works with compressed gases	Compressed Gas Cylinder Training, Engineering Lab Safety Training, or General Lab Safety Training	Before beginning work
Works with electricity	Electrical Safety Training or Engineering Lab Safety Training	Before beginning work

7.2 LABORATORY SPECIFIC TRAINING

The PI and/or Laboratory Supervisor shall conduct laboratory-specific hazard awareness training for all laboratory members prior to the initiation of work. All laboratory personnel must be trained by the PI or designated senior laboratory personnel. Training must be documented using **standard operating procedures** that are signed and dated by individuals who have been trained. Laboratory-specific training must cover:

- The specific chemical and physical hazards in the laboratory
- Measures personnel should take to protect themselves from the identified hazards such as appropriate work practices, engineering controls, personal protective equipment, etc.
- Signs and symptoms associated with the hazardous chemicals used in the laboratory
- The permissible exposure limits for OSHA regulated substances or the recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard

7.3 STANDARD OPERATING PROCEDURES (SOPs)

SOPs standardize best practices for the laboratory. Each laboratory should have laboratory-specific SOPs pertaining to their specific hazards. A SOP can address a single chemical, a group of similar chemicals, or a process.

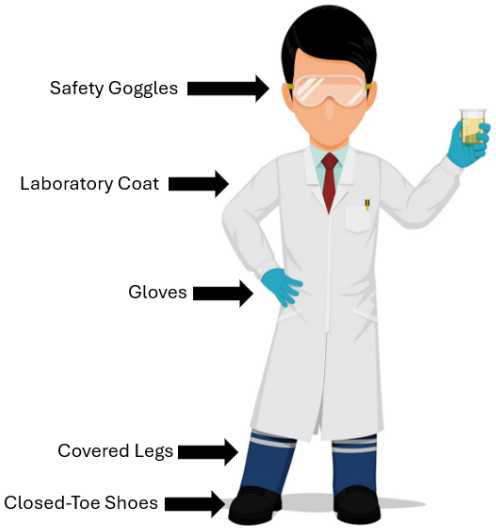
7.3.1 SECTIONS OF A SOP

SOPs must include:

- Title and Information
  - Title, PI name and signature, author of SOP, date SOP was written, date and description of any updates
- Purpose
- Hazards
  - Describe both the general and specific hazards of the chemicals(s) and/or procedure, the signs and symptoms of exposure, and any applicable exposure limits
- PPE
  - Describe the proper type of PPE for the chemicals and/or procedure, including skin and body protection, hand protection, eye protection, and any additional hygiene measures
- Engineering Controls
  - Describe any engineering controls that are used to help mitigate the risk (e.g., fume hoods, glove boxes)
- Storage and Handling Requirements
  - Describe any storage and handling requirements (e.g., handle under inert gas, incompatible with acids)
- Procedure
  - Describe how to safely use the chemical or conduct the procedure
- Spill, Incident, and First Aid Procedures
  - Describe emergency procedures for potential spills, incidents, injuries, exposures, fires, etc.
- Waste Disposal Procedures
  - Describe all waste disposal procedures, including incompatible wastes
- Signatures
  - Lab personnel must sign and date the SOP to certify that they have received the training and have read and understood the SOP

8 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The use of appropriate PPE is essential to maintain a safe working environment. PPE should be used in combination with, rather than as a substitute for, engineering controls, safe work practices, and chemical hygiene. PPE must be fitted to the individual and specific for the hazard. Only protective clothing and equipment that meet criteria developed by a Nationally Recognized Testing Laboratory (NRTL), when required, may be used. The supervisor is responsible for training those under their supervision on proper selection, use, and maintenance of PPE.



PPE and Appropriate Laboratory Attire

8.1 PROPER ATTIRE

All personnel entering a laboratory must wear the proper attire. Proper attire does not leave any exposed skin on the stomach, legs, or feet. Pants or skirts/dresses that cover the legs down to the ankles and shoes that cover the complete foot up to the ankle are required. Confine long hair and loose clothing. Clothing made of natural fibers is preferred as synthetic fibers can melt and adhere to the skin in laboratories with fire hazards, such as flammable chemicals, pyrophorics, Bunsen burners, etc. Nonpermeable footwear is also preferred.

8.2 LABORATORY COATS

Laboratory coats are required to be worn when working with hazardous materials in a laboratory. Laboratory coats should be worn fully buttoned or snapped with the sleeves down. Proper use of laboratory coats reduces exposure to hazardous materials by covering personal clothing and exposed skin, preventing exposures to hazardous chemicals from incidental contact and small

splashes. Remove laboratory coats before leaving the laboratory to prevent the spread of hazardous material contamination outside of the laboratory. Never take reusable laboratory coats home for laundering and never launder a laboratory coat contaminated with acutely hazardous chemicals. Flame resistant laboratory coats must be cleaned by a qualified commercial vendor to retain their flame-resistant properties. During the PPE selection process, one should consider the following:

- Flame resistant lab coats are required when handling pyrophoric materials outside of a glove box, spontaneously combustible materials, extremely flammable chemicals with a flash point below 73 º F (23 ºC), or greater than 4 L of flammable chemicals
- Laboratory coats with different properties should be easily distinguishable (i.e., flame resistant coats should have outer markings clearly identifying them as flame resistant and can be ordered in a different color than the other coats in the laboratory)
- Supplement the laboratory coat with a rubber or vinyl apron when there are significant splash hazards
- Laboratory coats with snap closures on the front allow for easier removal in case of contamination
- Tight cuffs are recommended

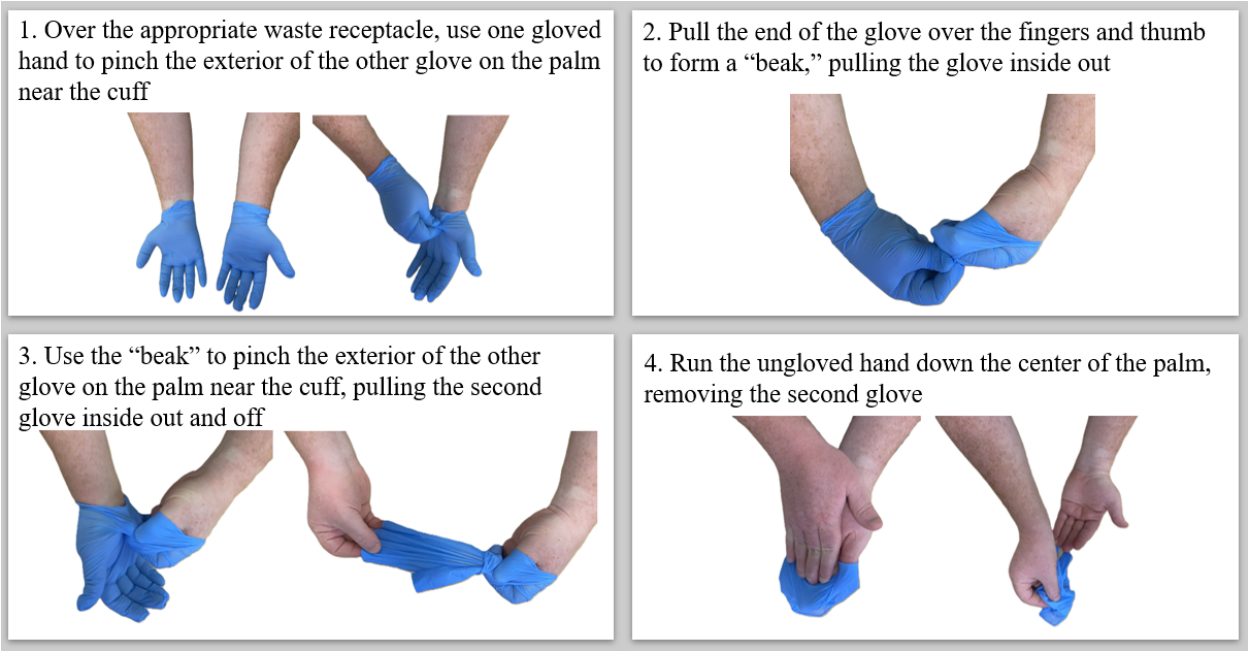
8.3 GLOVES

Gloves are required when handling hazardous chemicals in a laboratory. Gloves should be selected based on the hazard. Always inspect gloves for holes and tears before each use and never reuse disposable gloves. Gloves must not be worn when touching exterior door handles or in common areas (e.g., elevators, restrooms, breakrooms, corridors, etc.). Remove gloves carefully to avoid contact between the outside of the glove and bare skin. Wash hands and forearms thoroughly after removing gloves and before exiting the laboratory. During the PPE selection process, one should consider the following:

- Manufacturer recommendations and permeability ratings should be considered when selecting a glove for protection against hazardous chemicals
- Replace gloves periodically depending on their permeation and degradation characteristics
- Abrasion resistant gloves (e.g. leather) should be worn when handling broken glass or other rough sharp-edged objects but should not be used for handing chemicals
- Heat or cold resistant gloves should be worn when handling very hot or very cold materials
- Select the proper size glove

To properly remove gloves, use the beaking method:

- Over the appropriate waste receptacle, use one gloved hand to pinch the exterior of the other glove on the palm near the cuff
- Pull the end of the glove over the fingers and thumb to form a “beak,” pulling the glove inside out
- Use the “beak” to pinch the exterior of the other glove on the palm near the cuff, pulling the second glove inside out and off
- Run the ungloved hand down the center of the palm, removing the second glove



Beaking Method of Glove Removal

8.4 EYE AND FACE PROTECTION

All safety glasses, safety goggles, face shields, and other eye and face protection devices must meet the requirements of the ANSI Z87 standard. At a minimum, safety glasses must be worn at all times in all laboratory spaces. During the PPE selection process, one should consider the following:

- Safety glasses should be upgraded to splash-resistant chemical goggles when pouring liquid chemicals or conducting other procedures with a risk of splashes
- Non-vented goggles provided superior protection from splashes, dusts, and vapors than vented goggles
- Face shields are not to be worn alone and must only be used as a secondary means of eye and face protection with appropriate primary eye protection worn underneath
- For those who wear prescription lenses, eye protectors must either incorporate the prescription in the design or fit properly over the prescription lenses.

8.5 RESPIRATORY PROTECTION

A respirator should be used when it is not possible to minimize or eliminate exposures to hazardous chemicals through other means. All individuals using a respirator must be enrolled in UNT's Respiratory Protection Program. Contact RMS Occupational Safety prior to use of a respirator.

9 GENERAL HYGIENE

9.1 SAFETY SIGNAGE

According to NFPA 400.6.1 8.1.3, posting of appropriate safety signs near the entry doors to laboratories ensures both UNT personnel and emergency responders are aware of the hazardous material stored and utilized in these areas. Safety signs must remain unobstructed, legible, and current and should not be removed.

Contact EH&S for the safety signage template. An example can be found in Appendix A.

9.2 MAINTENANCE

Laboratories must be maintained to prevent hazards. For example, leaking faucets and drain lines can create an opportune environment for bacteria and mold to grow, increasing the risk for unwarranted exposures. Additionally, the presence of water can create a slip/trip/fall hazard. Poor lighting can create a hazardous working environment by limiting what personnel are able to see. Therefore, it is important that there are no leaking faucets, pipes, or drains and that all light fixtures are working properly. Ceilings, floors, and walls must be intact with no penetrations and all tiles in place.

Submit a work request to UNT Facilities Services to conduct any repairs. If EH&S finds a maintenance issue during a laboratory safety survey, EH&S will submit a work request to UNT Facilities Services.

9.3 HOUSEKEEPING

Housekeeping is an important element to laboratory safety. Maintaining a clean and orderly workplace reduces the risk of work-related accidents (e.g. slips, trips, falls, etc.), injuries (e.g. cuts, needle sticks), and exposures (e.g. surface and equipment contamination). Additionally, organization and routine cleaning practices reduce the potential for sample, culture, and stock contamination.

Keep the work area clean and uncluttered with chemicals and equipment being properly labeled and stored. Clean up the work area upon completion of an experiment or procedure and at the end of each day. Keep all areas of the lab free of clutter, trash, extraneous equipment, and unused chemical containers.

According to the NFPA, the primary entry doors to laboratories must always remain closed. They cannot be propped open. Doors must be locked when there are no personnel in the laboratory.

All aisles, corridors, stairs, and stairwells shall be kept clear of chemicals, equipment, supplies, boxes, and debris. A minimum of 3 feet (36 inches) must be maintained in walkways for proper egress during emergencies.

Access to emergency equipment, showers, eyewashes, fire extinguishers, exits and electrical panels shall never be blocked or obstructed. No object may be stored within 18 inches of any fire suppression fixtures, and safety showers/eye washes must have at least 36 inches of clearance at all times to allow immediate access and use. Emergency shutoff valves must be labeled, visible, readily accessible, and capable of being reached quickly for operation without removing obstacles.

The inappropriate use, overloading, and daisy-chaining of power strips/surge protectors can cause electrical fires. According to the National Electric Code and OSHA Standard 29 CFR 1910.305, power strips cannot be used as a substitute for fixed wiring structures (e.g., the use of a power strip as an extension cord is not allowed). Additionally, power strips and extension cords cannot run under doorways, through ceiling tiles, or along walkways and must be in good working order.

9.4 CHEMICAL HYGIENE

Clean up spills and leaks immediately.

Only authorized work should be performed in the laboratory. Personnel should act in a professional manner at all times and avoid any behavior which may distract or cause harm to themselves or others. Do not run, jump, rush, or horseplay where hazardous chemicals are handled or stored.

Always wash hands with soap and water after handling chemicals and remove personal protective equipment, such as gloves and lab coats, before leaving the lab. Wash areas of exposed skin thoroughly before leaving the laboratory. Do not touch door handles, personal devices, or other equipment used without gloves while wearing gloves.

Do not smell or taste chemicals. When it is necessary to identify a chemical's odor, lab personnel should hold the chemical container away from their face and gently waft their hand over the container without inhaling large quantities of chemical vapor.

Do not use mouth suction for pipetting or starting a siphon.

9.5 FOOD AND DRINK

The consumption of food and drink within laboratories is prohibited. Do not eat, drink, use tobacco products (smoke, chew, dip), chew gum, or apply cosmetics in areas where laboratory chemicals are present. Remove gloves, wash hands, and leave the area before conducting these activities. Do not store food or beverages in refrigerators or glassware that have been used for laboratory operations.

9.6 WORKING ALONE

Avoid working alone in the laboratory when working with particularly hazardous substances or other high hazard chemicals or processes.

Students under the age of 18 must be never be left to work alone in a laboratory.

10 CHEMICAL INVENTORY

Chemical inventories help emergency responders quickly identify potential hazards in case of emergencies and are used to ensure compliance with applicable regulations, such as the Emergency Planning and Community Right-to-Know Act. A list of all hazardous chemicals in the workplace is also a requirement of OSHA's Hazard Communication Standard.

Inventories must be maintained in Campus Optics so that amounts of hazardous chemicals can be determined for each building and for each campus. Additionally, Campus Optics maintains safety data sheets for each chemical in the inventory (see Section 11) as required by OSHA's Hazard Communication Standard.

Each space where hazardous chemicals are stored must maintain a current chemical inventory with the quantities of chemicals. All inventories must be reconciled at least annually. See the UNT Chemical Inventory Campus Optics Training Manual on the Laboratory Safety page of the RMS website for more information on how to enter and reconcile chemical inventories in Campus Optics.

11 SAFETY DATA SHEETS

Before working with any chemical, review the appropriate safety data sheet (SDS). SDSs are a useful resource on the hazards, safe handling, storage, and disposal of hazardous chemicals. A

current SDS must be available for each hazardous chemical in a laboratory's chemical inventory pursuant to OSHA's Hazard Communication Standard. At UNT, SDSs are housed in Campus Optics and are available from the Laboratory Safety page of the RMS website. SDSs can also be obtained through the manufacturer website, a request from RMS, and a request from the manufacturer. For more information on the sections and contents of SDSs, see Appendix B.

12 LABORATORY SAFETY SURVEYS

To protect the health and safety of laboratory personnel and the environment, EH&S conducts laboratory safety surveys to identify and address unsafe conditions and/or instances of non-compliance with applicable rules and regulations. Prior to conducting surveys, EH&S will provide pre-survey information, including the contents of the survey, via email to the PI or Laboratory Supervisor of record for each space that will be surveyed. Completed surveys will be sent to the supervisor of record, and the supervisor will have 30 days to rectify and respond to any issues that have been identified in the survey. If a response to EH&S has not been received after a minimum of 30 days, a reminder will be sent requesting a response within 7 days. If a response has still not been received after a minimum of 7 days of the reminder, the issues will be escalated to the director of EH&S and the University Integrity & Compliance Office. Follow-up surveys will be performed as necessary. See Appendix C for the laboratory safety survey checklist and guidance document.

13 HANDLING OF HAZARDOUS CHEMICALS

13.1 LABELING

OSHA adopted hazardous chemical labeling requirements that are in alignment with the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS), see Appendix D. Labels shall not be removed or defaced and damaged labels shall be replaced as necessary. All labels must be legible and in English. Every container in a laboratory must be clearly labeled, and the label must clearly identify the contents. Descriptions like "hazardous waste" or "organic waste" are not compliant. Container contents that are unknown are dangerous and costly to remove.

13.1.1 PRIMARY CONTAINERS

All hazardous chemicals received after June 1, 2015 must have labels containing:

- Product identifier
- Signal word
- Hazard statement(s)

- Precautionary statement(s)
- Pictogram(s)
- Name, address, and telephone number of the manufacturer, importer, or other reasonable party



Hazardous Chemical Label with Elements Identified

13.1.2 SECONDARY CONTAINERS

Labels must be applied to secondary containers when the material is not used within the work shift of the individual who makes the transfer, the individual who made the transfer leaves the work area, or the container is moved to another work area and is no longer in the possession of the individual who filled the container. This label must contain:

- Identity of the hazardous chemical(s)
- Hazards present

If abbreviations are used instead of full chemical names, an abbreviation chart should be in plain view. Groups of vials, small bottles, or samples can be labeled as a group.

13.1.3 SYNTHESIZED COMPOUNDS

When synthesizing (both known and novel) compounds and storing samples, containers labels must contain:

- Identity of the hazardous chemical(s)
- Hazards present
- Name or initials of the person who synthesized the material

If abbreviations are used instead of full chemical names, an abbreviation chart should be in plain view. Groups of vials, small bottles, or samples can be labeled as a group. Novel compounds with unknown hazards should be assumed to be hazardous.

13.2 TRANSPORTATION

When moving chemicals between laboratories or other buildings on campus, the following guidelines should be implemented to protect people and the environment and minimize the potential for spills to occur:

- Check containers and lids for damage; damaged containers cannot be transported
- Bring supplies compatible with the hazardous materials being transported (e.g. absorbent pads) in case of a spill
- Transport chemicals by traveling least-trafficked routes; use freight elevators when possible
- Avoid transporting materials during periods of high traffic or building activity
- Carry breakable containers in specially-designed bottle carriers or leak-resistant, unbreakable secondary containment
- Never transport incompatible chemicals in the same secondary containment
- Consider using a cart with high edges to contain leaks or spills
- Never transport hazardous materials in your personal vehicle or public transportation; contact EH&S for questions regarding transporting hazardous materials off of main campus
- Never leave chemicals in transport unattended



Bottle Carrier and Cart for Transporting Hazardous Chemicals

13.3 SEGREGATION AND STORAGE

Proper chemical storage minimizes exposures, prevents fires and explosions, and decreases the potential for accidents resulting from the mixture of incompatible chemicals. Laboratory chemicals should not be stored alphabetically. Chemicals must be segregated by physical state first and then into hazard classes. If incompatible chemical classes must be stored in close proximity, separate them by placing chemicals in secondary containers. Do not use metal chemical shipping containers for secondary containment or storage. All chemicals in a lab must have a designated storage location and should be returned to this spot after use. They should never be stored on the floor, unless in secondary containment. Ignition sources such as vacuum pumps, and variacs should be physically separated from flammables and combustibles.



Chemicals in Secondary Containment

13.3.1 FLAMMABLES

Pursuant to NFPA 45, all flammable liquids not in immediate use must be stored in a flammable cabinet that meets the construction design defined in NFPA 30. If flammable solids are also stored within the flammable cabinet, they must be segregated from flammable liquids via secondary containment.

Standard refrigerators or freezers must never be used to store flammable liquids as they are not electrically designed to do so. Store flammable liquids only in specially designed flammable storage refrigerators/freezers or explosion-proof refrigerators/freezers.

13.3.2 OXIDIZERS

Oxidizers must be stored separately from flammable liquids and reducing agents. Oxidizers, with the exception of nitric and perchloric acids, also cannot be stored with corrosives. They cannot be stored directly on wooden shelves without secondary containment.

13.3.3 CORROSIVES

Corrosives must be kept stored separately from flammable liquids and oxidizers. Segregate acids from bases and organics from inorganics with separate secondary containment if they are kept in the same cabinet.

Nitric and perchloric acids are oxidizers which, like other oxidizers, cannot be stored with flammable liquids or reducing agents and cannot be stored directly on wooden shelves without secondary containment; however, they can be stored alongside standard corrosives unlike other oxidizers. Nitric and perchloric acid must be stored within plastic secondary containers to prevent further incident in case of a spill or leak.

13.3.4 WATER AND AIR REACTIVE

Highly reactive substances should be stored in a glovebox or desiccator away from heat, light, and incompatible chemicals. If they produce flammable gas but not enough heat to ignite it, they can be stored in a flammable cabinet. If they produce fire, then they should be segregated from other flammables and not stored in the flammable cabinet as they are a source of ignition.

13.4 BONDING AND GROUNDING

When Category 1, 2, and 3 flammable liquids (flashpoint below 100 °F) are dispensed from a conductive container (metal, conductive plastics) greater than 4 L, the dispensing and receiving containers must be bonded and grounded to prevent the static ignition of flammable vapors.

Bonding ensures all components carry the same electrical potential. If the dispensing and receiving containers are both made of conductive materials, bond them by attaching a metal bonding strap or wire to both containers. Remove any dirt, debris, paint, etc. to ensure a good connection. If the receiving container is not conductive, use a metal rod or wire inserted into the receiving container to make the connection.

Grounding carries charge to the earth so that components have zero electrical potential. Connect the dispensing container to the ground with a good metal to metal connection free of dirt, debris, paint, etc. Grounding can be achieved through a connection with the ground plug in a wall outlet. Use specified grounding cords and do not stick wires into the outlet.

Discharge yourself by touching the ground after making connections and before starting any transfers.

14 WASTE

Every individual that generates waste is responsible for labeling and identifying their waste, placing the waste into an appropriate container, and proper storage of waste in their area until removal can occur. If something is discarded, abandoned, or inherently waste-like, it is considered a waste. Containers in poor condition (rusted, leaking, cracked, broken, etc.), stored improperly, or unlabeled are examples of inherently waste-like materials.

14.1 WASTE PICKUP REQUESTS

See the Hazardous Waste Management page on the RMS website to request hazardous waste pickup for chemical, universal, and biological wastes. For more information on hazardous wastes, see the UNT Waste Management Plan found on the Hazardous Waste Management page of the RMS website.

14.2 HAZARDOUS CHEMICAL WASTE

All chemical waste should be managed as if it is hazardous. Disposal of waste chemicals in sink drains and/or regular trash receptacles is not appropriate. UNT is registered with the Texas Commission on Environmental Quality as a generator of hazardous waste and therefore, strict regulations apply to the management and disposal of hazardous waste on campus.

14.2.1 CONTAINERS

It is critically important that only compatible wastes are placed into the same waste container. All containers must be in sound condition, compatible with their contents, not leaking, clean of spilled material, and handled/stored as to prevent rupture or leakage. Caps should be securely fastened, intact, and clean of any chemical residues. Containers that are leaking, rusted, or showing signs of precipitate formation must be promptly disposed of as chemical waste.

All containers must **remain closed at all times** except when adding or removing waste. For liquid wastes, leave about 20% of headspace in the container.

An empty container is any container which has been emptied using all normal practices and contains no more than one inch in the bottom of the container or 3% by weight of the total capacity of the container if the container is less than 119 gallons or 0.3% if over 119 gallons and **did not hold any acutely hazardous chemicals**. Any residue remaining must not be pourable. Empty containers may be placed into the municipal garbage if the label is defaced and the container is marked EMPTY.

Empty chemical containers can be reused to collect hazardous waste if the original contents were not acutely hazardous chemicals and the waste is compatible with any

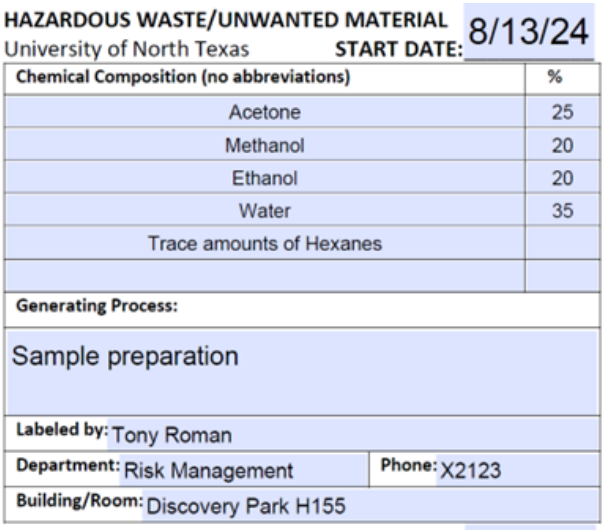
remaining residuals of the original product. Laboratory personnel must deface the original product label and label the container as hazardous waste.

Acutely hazardous chemicals are listed on the Environmental Protection Agency's P-list. Any container which held P-listed chemicals must not be disposed of or used as an empty container. Containers for P-listed chemicals must be disposed of by submitting a Chemical Waste Pickup Request.

14.2.2 LABELING

EH&S requires the use of an Unwanted Material/Hazardous Waste Label, see Appendix E, for each chemical waste container. Labels must be dated (month/day/year) and affixed to the container when waste is first added.

Labels must be legibly printed. Do not use abbreviations or molecular formulas. The chemical composition percentages (including water) must equal 100% on the label. Contents with less than 1% can be annotated as "trace" and do not require a percentage. Include a brief description of the generating process (cleaning, etching, etc.).



HAZARDOUS WASTE/UNWANTED MATERIAL
University of North Texas **START DATE:** 8/13/24

Chemical Composition (no abbreviations)	%
Acetone	25
Methanol	20
Ethanol	20
Water	35
Trace amounts of Hexanes	

Generating Process:
Sample preparation

Labeled by: Tony Roman
Department: Risk Management **Phone:** X2123
Building/Room: Discovery Park H155

Example Hazardous Chemical Waste Label

14.2.3 SATELLITE ACCUMULATION AREAS

A Satellite Accumulation Area (SAA) is the laboratory as a whole or a specific zone within the laboratory designated for storing hazardous waste until it is collected. The SAA must be located at or near the point of generation and under the control of the laboratory or shop worker that generated the waste. SAAs should be identified by the yellow "Satellite Accumulation Area" banner on the door sign exemplified in Appendix A. Additional SAA signage in Appendix F is recommended to designate a waste collection area within the laboratory.

Waste containers in SAAs should be placed in secondary containment.

SAAs are limited to no more than 55 gallons of hazardous waste or 1 quart of acutely hazardous waste. Submit waste requests well before the accumulation limits. If a SAA exceeds 55 gallons of hazardous waste or 1 quart of acutely hazardous waste, the generator shall immediately notify EH&S so that the event can be documented, including the date that the excess occurred, and all waste removed within 10 calendar days.

14.2.4 CHEMICAL WASTE PICKUP REQUEST

Dispose of chemical waste containers within six months of its accumulation start date or when it becomes full, whichever comes first.

In order to have chemical waste picked up from your accumulation area, submit a Chemical Waste Pickup Request. Complete the electronic form in its entirety and outline the contents of each container as completely as possible. If there are multiple waste containers of the same material, by clicking on the Actions button and Duplicate Container, the information will be auto populated for the next container on the form.

Containers without proper labeling will not be picked up.

14.3 USED OIL

Used oil is defined as any oil that has been refined from crude oil or any synthetic oil that has been used and, as a result of such use, is contaminated by physical or chemical impurities. Oils that are used as lubricants, hydraulic fluids, heat transfer fluids, and vacuum pump oil are all considered “used oil”. Do not mix used oil with other chemical wastes.

Used oil must be labeled as “Used Oil” **NOT** “Waste Oil” using the Unwanted Material/Hazardous Waste Label (Appendix E). All containers holding used oil must be in good condition and closed.

To dispose of used oil, submit a Chemical Waste Pickup Request. Under Item Category, select “Used Oil.”

14.4 UNIVERSAL WASTE

Universal waste regulations are a set of rules designed for the removal of certain hazardous wastes that are widely generated. Universal wastes have specific labeling, storage, and handling requirements that ease the regulatory burden associated with their accumulation. In the State of Texas, the following are considered universal wastes:

- Paint and paint-related waste
- Lamps or bulbs (fluorescent, sodium halide, halogen, etc.)

- Mercury-containing equipment
- Aerosol cans
- Batteries (lithium ion, nickel-cadmium, lead-acid, mercury oxide, silver-oxide, etc. but not alkaline)
- Some pesticides

Universal wastes must be labeled with the phrase "Universal Waste" and the type of waste. For example, a used aerosol can or container of used aerosol cans should be labeled "Universal Waste – Aerosol Can(s)." The label must also contain the date the material became a waste or when the container of waste began accumulation. Submit a Universal Waste Pickup Request within six months of the accumulation start date.

14.5 UNKNOWNS

Care shall be taken to prevent the generation of unknown waste. When a chemical unknown is discovered, every reasonable effort should be taken to identify the material, including but not limited to asking all laboratory members, reviewing the chemical inventory, reviewing laboratory notebooks, etc.

In the limited cases where the material cannot be identified, label the material with the Unwanted Material/Hazardous Waste Label (Appendix E) and state the Chemical Composition as "Unknown" with a volume percentage of 100%. Submit for disposal with a Chemical Waste Pickup Request. Disposal of unknowns is conducted at the PI/Laboratory Supervisor's expense.

14.6 BROKEN GLASS

Glass waste receptacles are rigid, puncture resistant containers with a plastic lining that should **exclusively** hold uncontaminated glassware. They should not be overfilled or exceed their maximum weight capacity. When ready for disposal, the box should be taped shut and discarded in the municipal dumpster.

Contaminated glassware must be placed in a rigid, puncture resistant container. The containers must be properly labeled and never filled to the point where they are protruding. Always line the box with a plastic liner (not a red biohazardous bag), securely tape the box, and label with the Unwanted Material/Hazardous Waste Label (Appendix E)**.** Make sure there is limited or no liquids placed in the box. Disposed as solid hazardous chemical waste by submitting a Chemical Waste Pickup Request.

Never dispose of mercury thermometers or other mercury-containing equipment (manometers, barometers, etc.) as glass waste. Submit a Universal Waste Pickup Request. See Section 14.4 for more information about universal wastes.

14.7 SHARPS

Do not recap needles. Keep razor blades organized and secure. Never leave blades unattended on benchtops. Place sharps into an appropriate rigid puncture resistant container immediately after use.

Chemically contaminated sharps with no infectious or bio-hazardous contamination should be placed in a rigid puncture resistant container with a lid or top that can be sealed with tape labeled "Chemically Contaminated Sharps" using the Unwanted Material/Hazardous Waste Label (Appendix E). Do **NOT** collect chemically contaminated sharps in red biohazard sharps containers. Chemically contaminated sharps can be submitted for disposal through the Chemical Waste Pickup Request.

Biologically contaminated sharps must be disposed of immediately after use in an appropriately sized, rigid, puncture-resistant, leak-resistant, and closable sharps container that is labeled with the biohazard symbol. Once the container has reached the maximum allowable fill level, the lid must be securely closed and locked according to the manufacturer's instructions and the exterior of the container should be inspected to ensure it is free from contamination. If exterior contamination is present, the container must be decontaminated or placed into a secondary biohazard bag prior to transport. The sealed sharps container should then be placed directly into a vendor-provided medical waste box and submitted for disposal through the Biological Waste Pickup Request.

Under no circumstances can sharps containers be filled passed their marked fill line or 75% of the container's capacity. Containers must never be forced closed or manually compressed to create additional capacity. Never attempt to retrieve items from a sharps container. At no time should sharps containers be reopened, emptied manually, or reused.

14.8 BIOLOGICAL WASTE

Collect biohazardous waste in designated biohazard containers lined with two red biohazard bags. Waste may accumulate only until the container reaches no more than two-thirds (2/3) of its capacity to prevent overfilling. Once the fill limit is reached, securely seal the inner red bag, then securely seal the outer red bag around the inner bag. Take care to avoid compressing or handling the bag in a manner that could cause leakage or puncture. Carefully remove the double-bagged waste from the container and place directly into a vendor-provided medical waste box that has been properly assembled according to the manufacturer's instructions. After the bag is placed inside, close the box in accordance with the manufacturer's closure requirements.

To dispose of biological waste, submit a Biological Waste Pickup Request. The requestor information, location information, and container specific information including the accumulation start date, container type, and majority content per container must be included in the request.

15 CLEANOUT, CLOSURE, AND DECOMMISSIONING

15.1 LABORATORY CLEANOUTS

Original chemical containers with no mixed chemicals that are damaged, expired, obsolete, or no longer in use should be periodically culled from the laboratory. Regular laboratory cleanouts help to prevent the formation of deteriorated or damaged containers, unknowns, and the accumulation of legacy chemicals. It is recommended to conduct a laboratory cleanout on at least an annual basis.

15.2 DECOMMISSIONING

Equipment from laboratories (e.g. glove boxes, manometers, weighing scales, microscopes, hot plates, glass distillers, microwaves, centrifuges, incubators, hot air ovens, autoclaves, fume-hoods, refrigerators, freezers, incubators, pH meters, etc.) where chemical, biological, and radioactive materials are stored and/or manipulated must be decontaminated before repair, maintenance, or removal from the laboratory. Approval from EH&S is required prior to the removal of any equipment from the laboratory.

15.3 EXITING LABORATORY PERSONNEL

Prior to leaving the laboratory, graduating or leaving personnel are responsible for cleaning their individual areas and equipment. They must submit Chemical Waste Pickup Requests for all of their samples and chemicals that the laboratory does not wish to retain.

For all samples and chemicals being retained by the laboratory, personnel must label the containers with proper chemical names and hazards. Groups of vials, small bottles, or samples can be labeled as a group. If abbreviations are used instead of full chemical names, an abbreviation chart or key identifying the contents of each sample and container must be given to the PI or Laboratory Supervisor.

15.4 LABORATORY CLOSURE

The PI and/or Laboratory Supervisor must notify EH&S when vacating or closing a laboratory. Prior to departure from the laboratory or University, the PI or Laboratory Supervisor is responsible for the following:

- Chemical inventory must be well-documented and up to date in Campus Optics, see Section 10.
- Any chemicals being given to another PI or laboratory must be physically and electronically (via Campus Optics) transferred.

- All chemicals requiring disposal must have legible labels. If a chemical(s) has been transferred into another container, the container must be labeled with the constituents in the container and the approximate volume percentage of each, see Section 14.2.2. Containers with empirical formulas **will not be accepted**.
- Submit chemicals requiring disposal for pickup in Campus Optics, see Section 14.2.4.
- Unknowns must be addressed. **Unknowns cannot be accepted** by EH&S for disposal or left behind in the laboratory. If there is an unknown, the PI/Laboratory Supervisor is required to seek an analytical determination of the chemical at the PI/Laboratory Supervisor's expense.
- All chemicals must be in appropriate containers and properly sealed. Parafilm, stoppers, flasks of all shapes and sizes, etc., are not acceptable.
- Graduate student experiments in containers must be documented before disengaging from the university. A waste pickup request will be accepted if the items are labeled and properly sealed in an appropriate container.
- Any pieces of equipment that require disposal and **are not** owned by UNT, must be documented and cleaned/decontaminated as needed before removal as outlined in Section 15.2.

16 COMPRESSED GASES

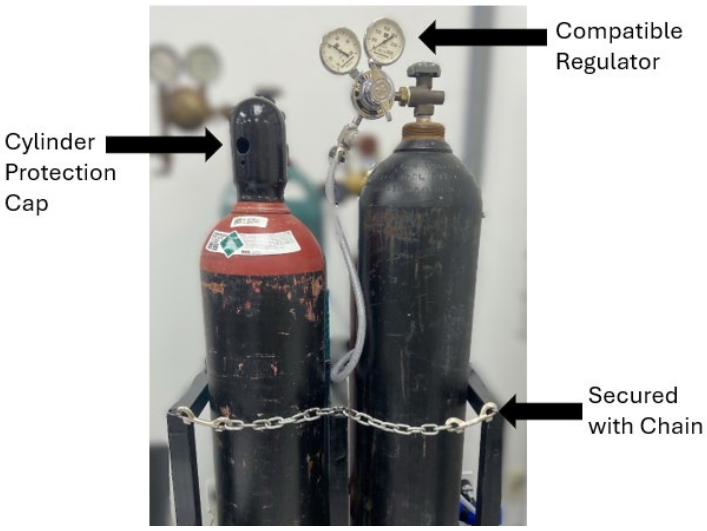
16.1 HANDLING

Pursuant to NFPA 55, compressed gas cylinders must always have the cylinder protection cap in place when not in use. Gas cylinders more than twelve inches tall must be secured by approved stands or wall brackets and be secured with a chain or belt above the midpoint but below the shoulder.

Do not remove the product identification label or change the cylinder color. It is recommended compressed gas cylinders be tagged full, in service, or empty to clearly indicate their status for safety and proper usage.

Reduce the pressure of a compressed gas through a manufacturer's specified regulator attached to the cylinder valve. Regulators are designed to work with specific gases; check for compatibility prior to use. When the compressed gas cylinder is closed after use, some gas remains in the regulator and/or system. Vent the gas in the regulator and/or system to relieve pressure prior to removal from the closed cylinder. If the gas is highly flammable or toxic, follow proper venting procedures to prevent exposure.

Never permit oil, grease, or other readily combustible substances to come into contact with oxygen cylinders, valves, or regulators. Do not tamper with pressure relief devices in valves or on the cylinders. Compressed gas cylinders should not be refilled or repaired except by qualified producers of compressed gases. Return leaking, corroded, damaged, and empty cylinders to the manufacturer.



Securing Compressed Gas Cylinders

16.2 TRANSPORTATION

The cylinder protection cap must always be in place when moving a cylinder. When cylinders are moved, they should not be subjected to abnormal mechanical shocks that may cause damage to their valves, their pressure relief devices, or to the cylinders themselves. Never drop cylinders or permit them to strike violently against each other. Avoid dragging, sliding, or rolling cylinders. Never lift a cylinder by the cap.

Gas cylinders should be moved using specially designed two wheeled transportation carts. Ensure that the transportation cart has straps or chains to secure the cylinder. Use a cradle for hoisting, never a lifting magnet or a sling. Use the freight elevator when possible. Do not allow people into the elevator with the cylinder.

When returning empty cylinders, close the valve before shipment. Leave some positive pressure in the cylinder. Replace any valve outlet and protective caps originally shipped with the cylinder. Mark and label the cylinder as empty.



Gas Cylinder Transportation Cart

16.3 STORAGE

Cylinders cannot be stored in transportation carts. They must be strapped or chained to a wall or benchtop and capped when not in use. No more than three cylinders may be chained together with one chain.

Flammable and oxidizing gases must be separated by at least 20 feet or by a non-combustible partition at least 5 feet high with a fire resistance rating of at least 30 minutes. The only exception is for cylinders currently in use.

17 CRYOGENIC LIQUIDS

Cryogenic liquids, or cryogens, are defined by the National Institute of Standards and Technology (NIST) as liquids with a normal boiling point below 93 K (-180°C/-240°F). Common cryogenic liquids include liquid nitrogen, liquid helium, and liquid argon. The most common cryogenic liquid on campus is liquid nitrogen. Liquid nitrogen is a colorless, odorless, inert, and non-toxic cryogenic liquid with a boiling point of 77 K (-196°C /-320°F). When it vaporizes, liquid nitrogen expands almost 700 times in volume.

Due to cryogenic liquids' extremely low boiling points, contact can result in thermal burns, frostbite, and permanent eye damage. Wear cryogenic-safe insulated gloves, eye protection, and laboratory appropriate attire when handling. Use tongs to submerge and remove objects from cryogenic liquids; never reach into or submerge hands or other parts of the body in cryogenic liquids. Work slowly to minimize boiling and splashing.

Many cryogenic liquids expand about 700 to 800 times their liquid volume when they vaporize. To prevent asphyxiation hazards, only handle cryogenic liquids in well-ventilated areas. The large volume expansion can also create an explosion hazard due to a buildup in pressure. Only store cryogenic liquids in approved containers with loose fitting lids made of insulating materials. Do not use metal lids. NEVER seal a container containing cryogenic liquids. NEVER tamper with or modify pressure relief devices.

18 HIGH HAZARD CHEMICALS

18.1 PARTICULARLY HAZARDOUS SUBSTANCES

Particularly hazardous substances as defined by OSHA include "select carcinogens," reproductive toxins, and substances which have a high degree of acute toxicity.

18.1.1 SELECT CARCINOGENS

Carcinogens are agents that can cause cancer. A "select carcinogen" meets at least one of the following:

- Regulated by OSHA as a carcinogen
- Listed under the category "known to be carcinogens" in the Annual Report on Carcinogens published by the National Toxicology Program (NTP)
- Listed under Group 1 "carcinogenic to humans," Group 2A "probably carcinogenic to humans," or Group 2B "possible carcinogenic to humans" by the International Agency for Research on Cancer (IARC)

18.1.2 REPRODUCTIVE TOXINS

Reproductive toxins are agents which can cause adverse effects on reproductive function, fertility, pregnancy outcomes, and/or fetal development. They can cause DNA mutations (mutagens) or cause abnormalities following fetal exposure during pregnancy (teratogens). Any reproductive toxin should be considered a particularly hazardous substance. However, OSHA specifically regulates only four agents based on their reproductive toxicity:

- Lead
- Ethylene oxide
- Dibromochloropropane (DBCP)
- Ionizing radiation (See the UNT Radiation Safety Manual for more information)

18.1.3 HIGH DEGREE OF ACUTE TOXICITY

Agents with a high degree of acute toxicity are substances defined by the OSHA Hazard Communication Standard as highly toxic or toxic which may be fatal or cause damage to

target organs as a result of a single exposure or exposures of short duration. Examples include hydrogen cyanide, hydrogen sulfide, and nitrogen dioxide.

18.1.4 SPECIAL PROVISIONS

Specific consideration should be given to the following provisions and included in a SOP where appropriate:

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

18.2 PEROXIDE-FORMING CHEMICALS

Some hazardous chemicals have the potential to form peroxides. A peroxide is a compound with an oxygen-oxygen single bond (R-O-O-R). The weak O-O bond decomposition can be triggered by shock, friction, or heat. This can lead to self-accelerating decomposition and explosion. Many peroxide forming chemicals are sold with inhibitors that help prevent peroxide formation. Whenever possible, the inhibited form of the chemical should be used. If a peroxide-former has crystals inside or around the bottle, precipitation, or cloudiness, DO NOT TOUCH and contact RMS immediately.

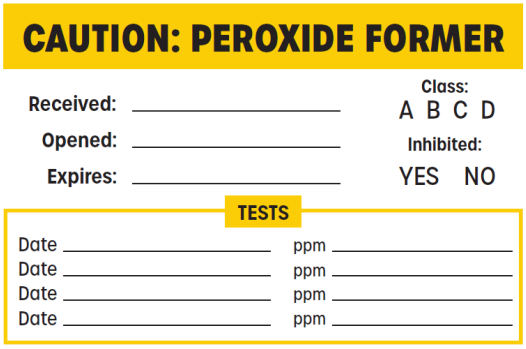
18.2.1 CLASSES

There are four classes of peroxide-forming chemicals.

- Class A: Chemicals that form explosive levels of peroxides without concentration even when unopened, e.g. isopropyl ether, divinyl ether, tetrahydrofuran (without inhibitor), potassium metal, sodium amide, divinylacetylene, vinylidene chloride
- Class B: Chemicals that form explosive levels of peroxides after concentration, e.g. tetrahydrofuran (with inhibitor), diethyl ether, dioxane, secondary alcohols, glyme, diglyme, furan, cumene, dicyclopentadiene, acetaldehyde, acetal, cyclohexene, cyclohexanol, vinyl ethers
- Class C: Chemicals that may auto-polymerize without inhibitor, e.g. methyl methacrylate, styrene, chloroprene, vinyl pyridine, vinyl acetate, acrylic acid, acrylonitrile
- Class D: Chemicals that form peroxides but cannot be clearly placed in Classes A through C, e.g.cyclooctene, allyl ether, benzyl ether, diethyl acetal, 1-pentene, tetrahydropyran

18.2.2 LABELS

Peroxide-forming chemicals must be dated upon receipt, opening, and any peroxide tests performed. Results of the tests must be included on the label. Labels are available from EH&S.



Peroxide Former Label

18.2.3 TESTING

For Class A, test for peroxides before every procedure. For Classes B-D, test every 6 months and before any high hazard procedures, including solvent evaporation and distillation. Never distill to dryness.

To test for peroxides, dip the peroxide test strip (Quantofix 100 recommended) into the chemical. Then add a drop of distilled water to the test strip.

Record the date and results (ppm) of all tests on the label.



Quantofix 100 Peroxide Test

18.2.4 DISPOSAL

Dispose of peroxide forming chemicals once they test over 30 ppm. If they test over 100 ppm, DO NOT TOUCH and contact RMS immediately.

Dispose of Class A chemicals within 3 months of receipt. Dispose of Class B-D chemicals by the expiration date or within 2 years of receipt.

18.3 HYDROFLUORIC ACID

HF is a particularly dangerous acid due to its unique ability to penetrate human tissue. The high electronegativity of the fluoride anion binds the hydrogen cation tightly and results in a weak dissociated state inorganic acid. In the undissociated state, the HF molecule is able to penetrate skin and soft tissue by non-ionic diffusion. The fluoride ions penetrate and form insoluble salts with calcium and can destroy deep tissue layers including bone.

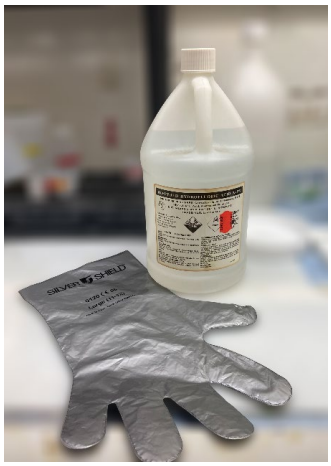
Many fluoride-containing chemicals (e.g. ammonium fluoride, sodium fluoride, sulfur tetrafluoride, and ammonium bi-fluoride) may react with acid or water to produce HF. If the manner in which the fluoride compound is used can create HF, follow the precautions for HF.

18.3.1 SAFE HANDLING PRACTICES

Always wear appropriate PPE. Splash resistant goggles, laboratory coats, and gloves are required. For brief use of dilute solutions, nitrile exam gloves can be employed. Consider double gloving. Nitrile rubber gloves are not recommended for handling ≥30% HF. For the use of concentrated solutions, use gloves that cover the hands, wrists, and forearms, such as butyl rubber, neoprene, or Silver Shield gloves. Consider using a face shield and an acid-resistant apron.

Always handle HF in a properly functioning fume hood in an area that is equipped with a safety shower and eye wash and that has adequate ventilation to minimize inhalation of vapors. Keep containers closed to minimize exposure and prevent etching of fume hood glass from HF vapors.

Ensure all containers of HF are clearly labeled. Never work with HF alone. Always ensure that calcium gluconate is available and unexpired in the immediate work area for skin treatment before handling HF.



Hydrofluoric Acid with Silver Shield Gloves

18.3.2 EXPOSURES

Pain is generated in the 1-24 hours following exposure or contact. Burns from HF solutions with less than 50 percent concentration may not be felt immediately. Burns from HF solutions of 20 percent or less concentration can take hours to become visible. If HF is not rapidly neutralized and the fluoride ion bound, tissue destruction may continue for days and result in limb loss or death.

Delayed and immediate effects as well as chronic effects can occur from short and long-term exposure. Deaths have been reported from concentrated acid burns to as little as 2.5% of the body surface area.

For dermal exposures:

1. Remove all exposed clothing taking necessary precautions to prevent self-exposure. Immediately wash all exposed areas with ample amounts of water.
2. Call 911 and seek medical attention immediately.
3. Apply calcium gluconate or carbonate gel while waiting to go to the hospital.
4. Then contact the PI and RMS.

For other exposures, replace step 1 with the following:

- If eye contact occurs: Flush the eye with water for 30 minutes.
- If inhalation occurs: Remove the individual from the contaminated atmosphere to a well-ventilated or outdoor area.
- If ingestion occurs: Give copious quantities of lime water, milk, or drinking water; continue drinking in spite of vomiting.

18.3.3 SPILLS

Do not use spill sorbents that contain silicon, such as vermiculite or sand, as they are incompatible with HF and can produce silicon tetrafluoride, an odorless toxic gas.

18.3.4 STORAGE AND DISPOSAL

Hydrofluoric acid etches glass due to the strong bond formed between fluoride anions and the silicon molecules in glass. HF will also react with glazes, enamels, pottery, concrete, rubber, leather, many metals (especially cast iron), and many organic compounds.

Store in containers made of polyethylene or fluorocarbon plastic. Never store HF in glass containers. Place storage bottles in compatible secondary containment.

Collect used HF-containing solutions in a polyethylene container, separate from other types of waste. The container must be labeled as "Hazardous Waste" with the name "Hydrofluoric Acid" clearly marked on the container, see Section 14.2.2.

18.4 PICRIC ACID

Dry picric acid is explosive and highly sensitive to heat, shock, and friction. Picric acid must be stored wet with at least 30% water. If the water content is allowed to drop below 10%, the picric acid becomes unstable and an explosion hazard. Picric acid can be rehydrated with deionized water to maintain the 30% water content.

Picric acid is incompatible with metals, bases, amines, ammonia, and concrete as they form explosive picrate salts, many of which are more sensitive to explosion than picric acid. Never store picric acid in metal containers or with unlined metal lids. Use wooden or plastic rather than metal spatulas when manipulating picric acid.

To prevent the formation of picric acid crystals that could detonate upon opening the bottle, clean the bottleneck, lid, and threads of the container with a wet cloth or paper towel before closing.

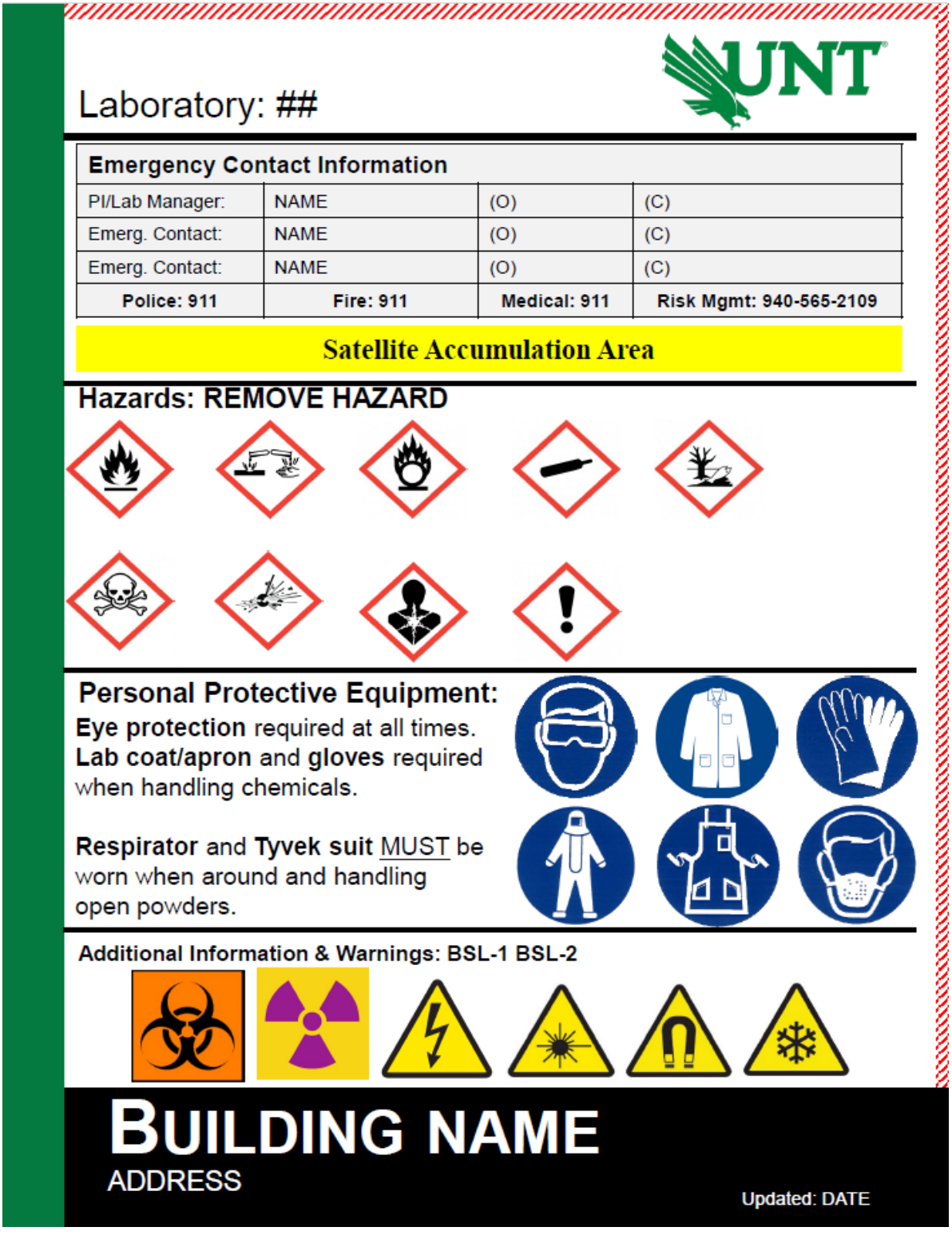
If crystals are observed inside or around a bottle of picric acid, DO NOT TOUCH and contact RMS immediately.

18.5 LOOSE NANOMATERIALS

Loose nanomaterials are materials that have an external dimension in the nanoscale (~1 – 100 nm) and are not embedded in a matrix. Examples include carbon nanotubes, some metal powders, metal oxides, and quantum dots. Loose nanomaterials must be handled inside of a fume

hood or HEPA filtered enclosure and/or a respirator must be worn. Contact UNT Occupational Safety prior to use of a respirator.

APPENDIX A: SAFETY SIGNAGE



Laboratory: ##

Emergency Contact Information			
PI/Lab Manager:	NAME	(O)	(C)
Emerg. Contact:	NAME	(O)	(C)
Emerg. Contact:	NAME	(O)	(C)
Police: 911	**Fire: 911**	**Medical: 911**	**Risk Mgmt: 940-565-2109**

Satellite Accumulation Area

Hazards: REMOVE HAZARD

Personal Protective Equipment:

Eye protection required at all times.
Lab coat/apron and **gloves** required when handling chemicals.

Respirator and **Tyvek suit** MUST be worn when around and handling open powders.

Additional Information & Warnings: BSL-1 BSL-2

BUILDING NAME
ADDRESS
Updated: DATE

APPENDIX B: SECTIONS OF SAFETY DATA SHEETS

Section 1: Identification

This section identifies the chemical. Required information includes:

- Product identified 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 chemical and the appropriate warning information associated with those hazards. Required information includes:

- Hazard classification of the chemical
- Signal word
- Hazard statement(s)
- Pictograms
- Precautionary statement(s)
- Description of any hazards not otherwise classified
- For a mixture that contains an ingredient(s) with unknown toxicity, a statement describing how much of the mixture consists of ingredient(s) with unknown acute toxicity

GHS hazard classifications are ranked in categories 1-4 with 1 being the most hazardous and 4 being the least hazardous.

Signal words provide an immediate indication of severity of the hazard. The chemical label will have one signal word indicating the greatest hazard in any class, and not all chemicals will have a signal word. Danger is used to indicate a greater hazard. Warning is used to indicate a lesser hazard.

Hazard statements provide further information about the nature of the hazard. Each statement has an H-code associated with it. The first number designates the type of hazard the hazard statement is assigned, with 2 a physical hazard, 3 a health hazard, and 4 an environmental hazard. The second and third numbers refer to the intrinsic properties of the substance or mixture.

Precautionary statements describe measures to minimize or prevent exposure and improper handling or storage.

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. Required information includes:

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

Mixtures also require the following:

- 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 when a trade secret claim is made, there is batch-to-batch variation, or the SDS is used fot a group of substantially similar mixtures

When 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. Required information includes:

- 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 fighting a fire caused by the chemical. Required information includes:

- 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. Required information includes 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. Required information includes:

- 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/Personal Protection

This section indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure. Required information includes:

- 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.

Section 10: Stability and Reactivity

This section describes the reactivity hazards of the chemical and the chemical stability information. Required information includes:

- 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
- 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
- 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

Section 11: Toxicological Information

This section identifies toxicological and health effects information, such as the LD50.

An LD50 is the estimated amount of a substance expected to kill 50% of test animals in a single dose.

Section 12: Ecological Information (Non-Mandatory)

This section provides information to evaluate the environmental impact of the chemical(s) if it were released to the environment.

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.

Section 14: Transport Information (Non-Mandatory)

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

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.

Section 16: Other Information

This section indicates when the SDS was prepared or when the last known revision was made.

Environmental Health & Safety

APPENDIX C: LABORATORY SAFETY SURVEY CHECKLIST AND GUIDANCE DOCUMENT

GENERAL SAFETY

Standard	Yes	No, Corrected Onsite	No, Assigned to PI	No, Assigned to Facilities
1 Safety Signage at Entrance(s)	☐	☐	☐	☐
2 Main Doors Closed	☐	☐	☐	☐
3 Fire Extinguisher Compliant	☐	☐	☐	☐
4 18” Clearance from Fire Suppression Fixtures	☐	☐	☐	☐
5 Testing and Inspection of Safety Showers/Eye Washes	☐	☐	☐	☐
6 Safety Shower/Eye Washes Clearance	☐	☐	☐	☐
7 Adequate Lighting	☐	☐	☐	☐
8 Plumbing Fixtures Functional	☐	☐	☐	☐
9 Equipment to Promote Proper Laboratory Hygiene Available	☐	☐	☐	☐
10 Ceilings/Floors/Walls Intact	☐	☐	☐	☐
11 Air Balancing Correct	☐	☐	☐	☐
11 Egress Pathways	☐	☐	☐	☐
12 Emergency Shutoff Devices Unobstructed	☐	☐	☐	☐
13 Electrical Panels Unobstructed	☐	☐	☐	☐
14 Appropriate Use of Power Strips (Relocatable Power Taps)	☐	☐	☐	☐
15 Compressed Gas Cylinders Secure	☐	☐	☐	☐
16 Oxidizing and Flammable Gases Separation	☐	☐	☐	☐
17 Ignition Sources Segregated from Flammables/Combustibles	☐	☐	☐	☐

18 Appropriate Personal Protective Equipment (PPE) Available	☐	☐	☐	☐
19 Laboratory Personnel Wearing Personal Protective Equipment (PPE)	☐	☐	☐	☐
20 Personnel Attire Appropriate for Laboratory Operations	☐	☐	☐	☐
21 No Food or Drink in the Laboratory	☐	☐	☐	☐
22 Good Housekeeping	☐	☐	☐	☐
23 First-Aid Kit Available and Maintained	☐	☐	☐	☐

CHEMICAL SAFETY

Standard	**Yes**	**No, Corrected Onsite**	**No, Assigned to PI**	**No, Assigned to Facilities**
24 Chemical Spill Kit	☐	☐	☐	☐
25 Hazardous Chemical Inventory Maintained	☐	☐	☐	☐
26 Chemical Containers Properly Stored	☐	☐	☐	☐
27 Chemicals Properly Labeled	☐	☐	☐	☐
28 Chemical Containers and Storage Units in Good Condition	☐	☐	☐	☐
29 Peroxide-Forming Chemicals Managed	☐	☐	☐	☐
30 Flammables Stored in Flammable Cabinet	☐	☐	☐	☐
31 Proper Segregation of Oxidizers	☐	☐	☐	☐
32 Proper Segregation of Corrosives	☐	☐	☐	☐
33 Proper Segregation of Nitric & Perchloric Acid	☐	☐	☐	☐
34 Hazardous Chemicals Stored in Cold Room	☐	☐	☐	☐
35 Chemical Fume Hood Free of Excess Storage	☐	☐	☐	☐

36 Chemical Fume Hood Annual Verification	☐	☐	☐	☐
37 Glass Waste Box Properly Managed	☐	☐	☐	☐
38 Proper Reuse of Chemical Containers for Hazardous Waste	☐	☐	☐	☐
39 Hazardous Waste Containers Capped	☐	☐	☐	☐
40 Accumulation of Hazardous Waste Labeled Properly	☐	☐	☐	☐
41 Hazardous Waste Contained	☐	☐	☐	☐
42 Satellite Accumulation Area (SAA) Labeled Correctly	☐	☐	☐	☐

BIOLOGICAL SAFETY

Standard	**Yes**	**No, Corrected Onsite**	**No, Assigned to PI**	**No, Assigned to Facilities**
43 Biosafety Level 2 Lab Door Sign (Tissue Culture Room)	☐	☐	☐	☐
44 Biosafety Level 2 Lab Doors Closed (Tissue Culture Room)	☐	☐	☐	☐
45 Biosafety Cabinet (BSC) Certification	☐	☐	☐	☐
46 Biosafety Cabinet (BSC) Work Surfaces Maintained	☐	☐	☐	☐
47 Centrifuges Properly Maintained	☐	☐	☐	☐
48 Incubators Properly Maintained	☐	☐	☐	☐
49 Shaking Incubator Flask Holders/Clamps Properly Maintained	☐	☐	☐	☐
50 Active Water Bath(s) Maintained	☐	☐	☐	☐
51 Inactive Water Bath(s) Maintained	☐	☐	☐	☐
52 Appropriate Equipment Labeled with Biohazard Stickers	☐	☐	☐	☐
53 Aspiration Flasks/Tubing Properly Maintained	☐	☐	☐	☐

54 Aspiration Flasks in Secondary Containment	☐	☐	☐	☐
55 House Vacuum System Protected	☐	☐	☐	☐
56 Sharps Properly Managed	☐	☐	☐	☐
57 Proper Storage in Environmental Rooms (i.e. Cold/Warm Rooms)	☐	☐	☐	☐
58 Mold Present in Environmental Room(s)	☐	☐	☐	☐
59 Proper Surface and Equipment Disinfectants Available	☐	☐	☐	☐
60 Biological Spill Materials	☐	☐	☐	☐
61 Autoclave Waste Managed Properly	☐	☐	☐	☐
62 Medical/Biological Waste Managed Properly	☐	☐	☐	☐

COMMENTS

LABORATORY SAFETY SURVEY GUIDANCE DOCUMENT

GENERAL SAFETY

Safety Signage at Entrance(s)

According to NFPA 400.6.1 8.1.3, posting of appropriate safety signs near the entry doors to our campus laboratories ensures both UNT personnel and emergency responders are aware of the hazardous materials stored and utilized in these areas. These safety signs must remain unobstructed, legible, and current, and should not be removed.

Main Doors Closed

According to the NFPA the primary entry doors to laboratories must always remain closed. They cannot be propped open.

Fire Extinguisher Compliant

The fire extinguisher is available, mounted, clearly labeled, and fully charged, complete with appropriate safety pins and seals. Make sure the fire extinguisher displays a current annual inspection date.

18" Clearance from Fire Suppression Fixtures

No object may be stored within 18 inches of any fire suppression fixtures. This 18-inch clearance ensures compliance with NFPA 13.8.5.5.2.1.

Testing and Inspection of Safety Showers/Eye Washes

Plumbed emergency eyewash and safety showers should be activated weekly to verify proper operation and EHS performs annual testing and inspections of eyewashes and emergency showers.

Safety Shower/Eye Wash Clearance

In the event of an emergency, functional and verified safety showers and eye washes must be readily available to all laboratory personnel. These may be located directly in the laboratory or within the hallway corridor. According to the ANSI Standard and the Americans with Disability Act (ADA), safety showers/eye washes must have at least 36" of clearance to allow immediate access and use at all times.

Adequate Lighting

Poor lighting can create a hazardous working environment by limiting what personnel are able to see; therefore, it is important for all light fixtures to be working properly. Please contact Facilities Services to replace or repair nonfunctional light fixtures.

Plumbing Fixtures Functional

Leaking faucets and drain lines can create an opportune environment for bacteria and mold to grow, increasing the risk for unwarranted exposures. Additionally, the presence of water can create a slip/trip/fall hazard. Please contact Facilities to evaluate any potential leaking pipes or drains.

Equipment to Promote Proper Laboratory Hygiene Available

According to the UNT Biosafety Manual, the Biosafety in Microbiological and Biomedical Laboratories 5th Edition, and the Bloodborne Pathogen 29 CFR 1910.1030, in BSL-1 and BSL-2 laboratories where sinks are present, a sink must be identified for hand washing. Personnel must have access to liquid handwashing soap to facilitate proper handwashing following the removal of gloves and prior to leaving the lab. Hand sanitizer must be available in BSL-2 laboratories that do not have sinks.

Ceilings/Floors/Walls Intact

No penetrations in the floors, walls, or ceiling/all ceiling tiles in place.

Air Balancing Correct

If the room is BSL-1, BSL2, or BSL-2+ is the room negative to the hallway.

Egress Pathways

According to the NFPA and the ADA, a minimum of three feet (36”) must be maintained in walkways for proper egress during emergencies. All items must be kept to a minimum within laboratory bench bays, hallways, and walkways.

Emergency Shutoff Devices Unobstructed

According to the UNT Chemical Safety Manual, emergency shutoff valves must be labelled, visible, readily accessible, and capable of being reached quickly for operation without removing obstacles.

Electrical Panels Unobstructed

According to OSHA and NFPA standards, electrical panels cannot be blocked. Please remove the obstruction.

Appropriate Use of Power Strips (Relocatable Power Taps)

The inappropriate use, overloading, and daisy-chaining of power strips/surge protectors can cause electrical fires. According to the National Electric Code and OSHA, power strips cannot be used as a substitute for fixed wiring structures (e.g., the use of a power strip as an extension cord is not allowed). Additionally, power strips and extension cords cannot run under doorways, through ceiling tiles, or along walkways and must be in good working order.

Compressed Gas Cylinders Secure

According to NFPA 55 regulations, all gas cylinders must be secured and also capped when not in use.

Oxidizing and Flammable Gases Separation

Flammable gases (e.g., hydrogen, methane, propane, acetylene) and oxygen (or other oxidizing gases) must be separated by 20 feet or by a non-combustible partition extending 18 inches above and to the sides of stored gas cylinders.

Ignition Sources Segregated from Flammables/Combustibles

Ignition sources such as vacuum pumps, variacs should be physically separated from flammables and combustibles.

Appropriate Personal Protective Equipment (PPE) Available

According to Texas Health and Safety Code Title 6 Subtitle D Chapter 502.0017(b) and the UNT Biosafety and Chemical Safety Manuals, principal investigators and department supervisors are required to provide employees and students with appropriate PPE. The minimal PPE required when working in research laboratories: gloves, lab coats, and eye protection.

Laboratory Personnel Wearing Personal Protective Equipment (PPE)

According to the UNT Biosafety and Chemical Safety Manuals, laboratory personnel must wear, at a minimum, a laboratory coat, gloves, and eye protection when engaged in any laboratory research activities (e.g. lab bench, fume hood, biosafety cabinet, microscope station, etc.). Additional PPE (e.g. respirators, cryo-gloves, etc.) may be required based on the workplace, the hazard, and/or how the hazard is manipulated (e.g. aerosol production, etc.).

Personnel Attire Appropriate for Laboratory Operations

According to the UNT Biosafety and Chemical Safety Manuals, laboratory personnel must wear clothing appropriate for the workplace. Personnel must ensure pants or skirts/dresses cover the legs down to the ankles and shoes cover the complete foot up to the ankle.

Food or Drink in the Laboratory

UNT policy prohibits storage and consumption of food and drink within laboratories. Do not eat, drink, use tobacco products (smoke, chew, dip), chew gum, or apply cosmetics in areas where laboratory chemicals are present. Remove gloves, wash hands and leave the area before conducting these activities. Do not store food or beverages in refrigerators or glassware that have been used for laboratory operations.

Good Housekeeping

Housekeeping is an important element to a laboratory safety. Keep the work area clean and uncluttered with chemicals and equipment being properly labeled and stored. Clean up the work area upon completion of an experiment or procedure and at the end of each day.

Maintaining a clean and orderly workplace reduces the risk for work-related accidents (e.g. slips, trips, falls, etc.), injuries (e.g. cuts, needle sticks), and exposures (e.g. surface and equipment contamination). Additionally, organization and routine cleaning practices reduce the potential for sample, culture, and stock contamination.

First-Aid Kit Available and Maintained

First-aid supplies should be readily accessible to staff at all times and must be regularly maintained, including restocking and removing expired items.

CHEMICAL SAFETY

Chemical Spill Kit

According to the UNT Chemical Safety Manual, all contiguous laboratory areas that utilize hazardous chemical materials must have a chemical spill kit. The spill kit contents must include eye protection, gloves, hand broom & dustpan, container for spill cleanup waste, and materials capable of absorbing, neutralizing, and inactivating hazardous materials in the event of a spill. The location of the spill kit must be labeled and unobstructed. Spill kits should be readily accessible and all personnel working in the lab should know their location. Spill kits should also be checked regularly to make sure they are fully stocked and adequate for the work being done.

Hazardous Chemical Inventory Maintained

According to Texas Hazardous Communications Act, all laboratories are required to maintain a real-time inventory of stored hazardous chemicals within each room and keep the list posted at the entrance.

Chemical Containers Properly Stored

All chemicals in a lab must have a designated storage location and should be returned to this spot after use. They should never be stored on the floor, unless in secondary containment.

Chemicals Properly Labeled

According to the Texas Health and Safety Code Title 6 Subtitle D Chapter 502 Section 502.007, labels on stock containers of hazardous chemicals must not be removed or defaced and must conform to the OSHA standard. Secondary containers must be labeled with at least the identity appearing on the Safety Data Sheet (SDS) and the appropriate hazard warnings.

Chemical Containers and Storage Units in Good Condition

Chemical containers should be in good condition, free from visible damage or deterioration. Caps should be securely fastened, intact, and clean of any chemical residues. Labels need to be intact and clearly legible. Containers that are leaking, rusted, or showing signs of precipitate formation must be promptly disposed of as chemical waste.

Peroxide-Forming Chemicals Managed

According to the UNT Chemical Safety Manual, many chemicals form potentially explosive peroxides upon storage. It is best practice to date these chemicals when they are first received and when opened. Please contact the Environmental Health and Safety at ehs@unt.edu for assistance.

Flammables Stored in Flammable Cabinet

According to NFPA 45 rules, all flammable liquids not in immediate use must be stored in a flammable cabinet that meets the construction design defined in NFPA 30 (2000).

Proper Segregation of Oxidizers

According to NFPA regulations, all hazardous chemicals must be stored according to their hazard classification. Please segregate hazardous chemicals accordingly. •Oxidizers: Oxidizers must be stored separately from Flammable liquids and reducing agents and cannot be stored on wooden shelves. Oxidizers with the exception of Nitric and Perchloric acids also cannot be stored with corrosives. Please store oxidizers separately from incompatible chemical classes and in a proper cabinet (metal, plastic, or resin).

Proper Segregation of Corrosives

According to NFPA regulations, all hazardous chemicals must be stored according to their hazard classification. Please segregate hazardous chemicals accordingly. •Corrosives: Corrosives must be kept stored separately from flammable liquids and oxidizers. Additionally, acids and

bases must be physically segregated from one another if they are kept in the same cabinet with separate secondary containment.

Proper Segregation of Nitric & Perchloric Acid

According to NFPA regulations, all hazardous chemicals must be stored according to their hazard classification. Please segregate hazardous chemicals accordingly. •Nitric and Perchloric Acid: Nitric and perchloric acids are oxidizers which, like other oxidizers, cannot be stored with flammable liquids or reducing agents and cannot be stored on wooden shelves; however, they can be stored alongside standard corrosives unlike other oxidizers. Nitric and perchloric acid must be stored within plastic secondary containers to prevent further incident in case of a spill or leak. Please store nitric and perchloric acid separately from incompatible chemical classes, in a proper cabinet (metal, plastic, or resin), and within secondary containment.

Hazardous Chemicals Stored in Cold Room

Cold rooms are walk-in spaces designed for researchers to store materials below room temperature. It is important not to store items like cryogens, dry ice, compressed gases (except air), flammable materials, toxic chemicals, or acids in these rooms.

Chemical Fume Hood Free of Excess Storage

According to the UNT Chemical Safety Manual, storing excessive amounts of chemicals, waste included, or equipment inside the fume hood may restrict the airflow required for proper function. Large equipment, such as centrifuges, must be elevated at least two inches from the base of the fume hood interior. Additionally, ensure that all materials within the fume hood are maintained at least six inches away from both the sash opening and the baffles.

Chemical Fume Hood Annual Verification

EH&S verifies fume hoods on an annual basis. If a fume hood fails verification a warning sign explaining why the fume hood failed verification will be placed on the fume hood sash. **EH&S will contact Facilities Services to re-evaluate the unit airflow, and will re-test the unit.**

Glass Waste Box Properly Managed

Glass waste receptacles should exclusively hold uncontaminated glassware, ensuring they are neither overfilled nor exceed their maximum weight capacity.

Proper Reuse of Chemical Containers for Hazardous Waste

Empty chemical containers can be reused to collect hazardous waste if the containers are compliant with EPA regulations. Hazardous waste chemicals collected must be compatible with the container itself and with any remaining residuals of the original product. Laboratory

personnel must deface the original product label and mark the container with the words "Hazardous Waste" plus the container contents.

Hazardous Waste Containers Capped

According to EPA regulations, all containers containing hazardous waste must be capped at all times except when hazardous waste is being added to or removed from the containers.

Accumulation of Hazardous Waste Labeled Properly

All hazardous waste containers must be labeled with the following information: "Hazardous Waste/Unwanted Waste," the generator's information, the date of initial accumulation, the generating process, and the chemical composition of the waste. Labels must be applied to containers and dated immediately upon beginning waste accumulation.

Hazardous Waste Contained

According to the UNT Chemical Safety Manual, all waste containers storing hazardous waste must be stored in secondary containment. Secondary containment must have sufficient holding capacity to contain the entire contents of the largest waste container.

Satellite Accumulation Area (SAA) Labeled Correctly

A Satellite Accumulation Area (SAA) is the laboratory as a whole or a specific zone within the laboratory designated for storing hazardous waste until it is collected. The SAA must be located at or near the point of waste generation and must be appropriately labeled.

BIOLOGICAL SAFETY

Biosafety Level 2 Lab Door Sign (Tissue Culture Room)

According to the UNT Biosafety Manual and the 5th Edition of Biosafety in Microbiological and Biomedical Laboratories, it is required that a Biohazard Door Sign be displayed on all entry doors to BSL-2 laboratories listing the Risk Group, BSL-2 agent, and PPE required for entry.

Biosafety Level 2 Lab Doors Closed (Tissue Culture Room)

According to the UNT Biosafety Manual and the Biosafety in Microbiological and Biomedical Laboratories 5th Edition, access to a BSL-2 laboratory must be restricted and the door must remain closed.

Biosafety Cabinet (BSC) Certification

According to the UNT Biosafety Manual and OSHA 29 CFR 1910.01030(e)(2)(iii)(B), biosafety cabinets must be certified annually according to the NSF 49 Standard. Biosafety cabinets must be certified when installed, moved, or repaired.

Biosafety Cabinet (BSC) Work Surfaces Maintained

According to the UNT Biosafety Manual and the Biosafety in Microbiological and Biomedical Laboratories 5th Edition, to reduce the potential for spills and exposures, all BSC work surfaces and sub surfaces must be routinely decontaminated, cleaned, and free of excessive storage.

Centrifuges Properly Maintained

According to the UNT Biosafety Manual, clean centrifuges reduce the risk of exposure. Spills or leaks that have previously occurred within a centrifuge can later become aerosolized leading to exposure.

Incubators Properly Maintained

According to the UNT Biosafety Manual, clean incubators reduce the risk of exposure. Spills or leaks that have previously occurred within an incubator can lead to uncontrolled growth of mold, bacteria, and fungi.

Shaking Incubator Flask Holders/Clamps Properly Maintained

Culture spills related to improperly seated or secured flasks can expose laboratory personnel to infectious materials, damage circulating shakers, and contaminate surfaces and warm rooms. Please inform staff members to properly secure flask clamps to the incubator's circulating stage and to utilize the appropriate clamps for each flasks size.

Active Water Bath(s) Maintained

According to the UNT Biosafety Manual, water baths in use must have a sufficient amount of water to prevent the basin from drying out.

Inactive Water Bath(s) Maintained

According to the UNT Biosafety Manual, water baths with dry basins must be unplugged.

Appropriate Equipment Labeled with Biohazard Stickers

Labeling laboratory equipment utilized to cultivate, manipulate, and store infectious agents or materials ensures laboratory personnel are aware that this equipment may harbor these agents or materials.

Aspiration Flasks/Tubing Properly Maintained

According to the UNT Biosafety Manual, aspiration flasks and associated tubing must be maintained to prevent the growth of mold and other biological contaminants.

Aspiration Flasks in Secondary Containment

According to the UNT Biosafety Manual, aspiration flasks stored on the floor must be in secondary containment. This secondary containment must have sufficient holding capacity to contain the entire contents of the flask.

House Vacuum System Protected

According to the UNT Biosafety and Chemical Safety Manuals, a Polytetrafluoroethylene (PTFE) 0.45µm filter, or equivalent, must be attached in line with the vacuum spigot to prevent house line contamination. This includes all aspiration flasks. VacuGuards containing PTFE filters can be purchased through many different vendors, including Sigma.

Sharps Properly Managed

According to TCEQ and the UNT Biosafety Manual, sharps must be properly managed in all laboratory areas.

- ***Metal Sharps*:** This includes needles and blades. Place in a commercially purchased sharps container. These must be provided by each laboratory. Never attempt to retrieve items from a sharps container. Do not place sharps in plastic bags or other non-sharps containers.
- ***Plastic Sharps*:** This includes plastic disposable pipettes and pipette tips that have not been in contact with any biological material or any chemical hazard. Place in a sturdy cardboard box lined with a plastic bag. Once full, seal securely and label "TRASH".
- ***Overfilled sharps container:*** Under no circumstances can sharps containers be filled passed their marked fill line or 75% of the container's capacity.

Proper Storage in Environmental Rooms (i.e. Cold/Warm Rooms)

Paper based products (e.g. cardboard) and porous materials (e.g. Styrofoam) can harbor and facilitate the growth of mold. The storage of these materials in environmental rooms can lead to mold infestations which can contaminant experiments and exposure personnel. EH&S recommends the removal of these materials from the identified environmental rooms.

Note: Manufacturer-supplied cardboard boxes, designed for cold storage, can be stored in cold rooms and refrigerators. These boxes have special coatings that will delay the growth of mold.

Mold Present in Environmental Room(s)

According to the UNT Biosafety Manual, preventing the unintentional growth of mold in environmental rooms (i.e., cold/warm rooms) is essential to protecting research personnel, equipment, and supplies. When mold infestation is severe, room decontamination should be considered.

Proper Surface and Equipment Disinfectants Available

According to the UNT Biosafety Manual and the Biosafety in Microbiological and Biomedical Laboratories 5th Edition, the proper use of disinfectants will reduce biological contamination on laboratory surfaces, equipment, and reusable supplies. By reducing this contamination, the risk of exposure is reduced. Common laboratory disinfectants include alcohols, bleach, and quaternary ammonium compounds.

Biological Spill Materials

According to the UNT Biosafety Manual, biological spill materials must be present to all contiguous laboratory areas that utilize biological materials. The spill material contents must include materials capable of absorbing, neutralizing, and inactivating biological materials in the event of a spill.

Autoclave Waste Properly Managed

According to the UNT Autoclave Use and Verification Manual, all autoclave waste must be properly packaged, stored, and treated prior to disposal. Please correct the following items:

- ***Autoclave waste containers:*** Autoclave waste containers selected to hold solid biological waste must be composed of autoclave-safe material and leak-proof.
- ***Autoclave waste bags*****:** To ensure the proper treatment and disposition of autoclave waste**,** appropriate autoclave waste bags must be used. Bags used for autoclave waste must be marked for autoclave treatment and be orange or translucent. At no time can red bags be used for onsite autoclave waste treatment.
- ***Filling autoclave waste bags*****:** When 75% full, autoclave waste bags must be sealed by laboratory personnel prior to autoclave treatment.
- ***Autoclave waste bag storage:*** When autoclaves are not immediately available, biological waste must be properly stored until an autoclave is available. Laboratory personnel must place sealed autoclave waste bags in autoclavable bins, store the waste in areas under their control, and ensure the waste is promptly treated when an autoclave becomes available.
- ***Autoclave waste storage in public hallways:*** At no time should autoclave waste be stored in public hallways.

Medical Waste Properly Managed

According to the UNT Biosafety Manual, all medical waste (e.g., bulk unprocessed human and animal tissue) must be properly packaged and stored prior to collection. Please correct the following items:

- ***Medical waste boxes/bags:*** Laboratory personnel must use EH&S-provided medical waste boxes and bags to hold solid medical waste.
- ***Filling medical waste boxes/bags:*** When 75% full, medical waste bags must be tied shut by laboratory personnel, placed in the provided medical waste box, and the box must be properly closed prior to onsite storage.
- ***Medical waste storage:*** Laboratory personnel should promptly submit a medical waste pick-up request following the generation of a full medical waste box.
- ***Medical waste storage in public hallways:*** At no time should medical waste be stored in public hallways.

APPENDIX D: GLOBALLY HARMONIZED SYSTEM (GHS) PICTOGRAMS

The GHS includes criteria for the classification of health, physical and environmental hazards, as well as specifying what information should be included on labels of hazardous chemicals as well as safety data sheets. GHS classifications are ranked in categories 1-4 with 1 being the most hazardous and 4 being the least hazardous. The following are GHS pictograms:

Flame



- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides

Gas Cylinder



- Gases Under Pressure
- Chemicals Under Pressure

Exploding Bomb



- Explosives
- Self-Reactives
- Organic Peroxides

Flame Over Circle



- Oxidizers

Corrosion



- Skin Corrosion/Burns
- Eye Damage
- Corrosive to Metals

Exclamation Mark



- Irritant (Skin and Eye)
- Skin Sensitizer
- Acute Toxicity
- Narcotic Effects
- Respiratory Tract Irritant
- Hazard Not Otherwise Classified
- Hazardous to Ozone Layer

Health Hazard



- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

Skull and Crossbones



- Acute Toxicity (Fatal or Toxic)

Environment



- Aquatic Toxicity

APPENDIX E: UNWANTED MATERIAL/HAZARDOUS WASTE LABEL

HAZARDOUS WASTE/UNWANTED MATERIAL

University of North Texas **START DATE:**_____

Chemical Composition (no abbreviations)	**%**
Generating Process:	
Labeled by:	
Department:	**Phone:**
Building/Room:	

HAZARDOUS WASTE/UNWANTED MATERIAL

University of North Texas **START DATE:**_____

Chemical Composition (no abbreviations)	**%**
Generating Process:	
Labeled by:	
Department:	**Phone:**
Building/Room:	

APPENDIX F: SATTELINE ACCUMULATION AREA SIGNAGE

Hazardous Waste
Satellite Accumulation Area

Post this sheet to designate your accumulation area

Satellite Storage Areas – Federal regulations (40 CFR 262.15) allow a generator to accumulate as much as 55 gallons of non-acute hazardous waste or one quart of acutely hazardous waste (P listed) in containers at or near any point of generation.

STORAGE REQUIREMENTS
1. The area should be labeled as "Hazardous Waste Satellite Accumulation Area"
2. The storage area must be under the control of the operator of the process generating the waste.
3. The waste must be placed in containers that are in good condition.
4. The waste must be compatible with the containers.
5. The containers must be closed except during adding or removing of waste.
6. The accumulation area MUST be at or near any point of generation.
7. If hazardous waste is moved from the SAA, the material must be dated at the time of the move and a time limit becomes effective.

LABELING REQUIREMENTS
1. The containers must be marked with the words "Hazardous Waste" and acknowledge any hazards associated with the waste.
2. Mark through the old label or remove it to ensure there is no confusion about the container contents.
3. Each container must be labeled with the full name of each chemical component and its concentration, with a percentage equaling 100%.
4. Do not use abbreviations or chemical notation.
5. NO date is necessary for hazardous waste in this area.

Important Note: *Any accumulation of hazardous waste at a satellite area in excess of 55 gallons, or one quart of any acutely hazardous waste (P listed) must be marked with the date the excess amount began accumulating and must be moved to a hazardous waste storage facility outside of the lab within three days. While at the storage facility a weekly inspection log must be kept and you have 90 days from the date it was moved to the storage facility to ship the waste off campus.*

- Find a location accessible but out of the way of normal lab traffic, preferably in a chemical cabinet.
- Secondary containers are highly recommended (trays, buckets, etc.).
- Dispose of your hazardous waste at the next hazardous waste shipment.
- **Any questions, contact Risk Management Services, at (940) 565-2109 or email at AskRMS@unt.edu.**