

New Mexico Tech

Laboratory Research Safety Guide

December 2019

**Table of Contents**

PAGE

|  |  |
| --- | --- |
| Introduction | 3 |
| Scope and Applicability | 3 |
| Roles and Responsibilities | 3 |
| General Requirements | 5 |
| Appendix A Chemical Hygiene Plan | 9 |
| Appendix B Compressed Gasses-Under construction | 20 |
| Appendix C Laser Safety Under construction |  |
| Appendix D Electrical Safety Under construction |  |
| Appendix E Machine Shop and Machine Guarding Safety Under construction |  |
| Appendix F Ergonomics Under construction |  |
| Appendix G Respiratory Protection Under construction |  |
| Appendix H SOP Template | 21 |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

1. **Introduction**

The purpose of this document is to provide a general guideline for safe work in research laboratories. For more detailed information on the specific work you will be performing please consult your departments Lab Safety Guide, your Lab Safety Binder, and the Standard Operating Procedures you will be working with.

This document is not user specific and reading this document does not constitute lab safety training required prior to working in a lab. General lab safety training is available on Canvas, please contact HAZMAT if you need access to lab safety training, and consult with your Principal investigator about the specific training matrix you need for your research/lab work.

New Mexico Tech is committed to the creation of a safe environment for research and knowledge. In order to do this, it is imperative that we create a safety culture that strives to increase awareness of the importance of safety when handling any and all hazardous materials and equipment.

This document replaces all previous institutional Laboratory Safety Guides unless otherwise indicated.

This document is subject to change as needed to ensure the safety of lab personnel, and to comply with state OSHA regulations, and any and all other pertinent regulations. OSHA regulations are the absolute minimum required to perform research in a lab. Stricter guidelines are encouraged, and will be suggested in this document wherever deemed appropriate.

1. **Scope and Applicability**

This document applies to all NMT employees performing research regardless of their location. While not required by OSHA, this plan also covers graduate students performing independent research, and is recommended for students working on projects for the purpose of obtaining an NMT degree.

Biosafety and Animal Care Safety will be addressed in a separate document, please contact the Research Compliance Officer for more information.

1. **Roles and Responsibilities**

**HAZMAT**

HAZMAT is responsible for creating, maintaining, reviewing, and updating the New Mexico Tech Research Lab Safety Guideline.

HAZMAT will also:

* Provide guidance and technical assistance to Department Heads and Department Safety Officers with regard to the Department Research Lab Safety Guide as needed.
* Perform Safety evaluations and/or inspections on Research/Teaching Labs, and workshops.
* Provide Guidance and technical assistance for other safety issues, including, but not limited to, lab and process hazard assessments, SOP’s, training matrixes, spills, and PPE selection.
* Test lab air pressure and fume hood performance.
* Provide hazardous waste disposal services.

**Department Chairs and Department Safety Officers**

Department Chairs and Department Safety Officers are responsible for creating a Department Lab Safety Guide that provides additional safety guidelines for the unique research conditions in their departments. These Guidelines must be reviewed at a minimum annually, and updated as needed. Departments are encouraged to create department standard operating procedures for equipment and processes that are widely used in their department.

**Principle Investigators and Lab Managers**

Principle Investigators and Lab Managers are responsible for creating and maintaining Lab Safety Binders that include the following:

* Laboratory Hazard Assessment.
* Emergency Contacts.
* Roles and Responsibilities
* Escape Routes.
* Training Matrix for each lab personnel.
* Standard Operating Procedure for each process being performed in the lab. Please see the SOP section in the Chemical hygiene plan for more information about SOP’s.
* An updated chemical inventory.
* Standard Operating Procedures for handling chemicals, including spill response procedures.
* Standard Operating Procedures for each piece of equipment in the lab.
* Relevant Safety Data Sheets.
* Equipment User Manuals.
* Location of safety equipment in the lab (PPE, Safety Showers, Eyewashes, Fire Extinguishers, Spill Kits.
* Near Miss and Incident Reports

Principle Investigators and Lab Managers are also responsible for ensuring all lab personnel are adequately trained for the work they are performing in the lab, and ensuring all university, department, and laboratory protocols and guideline are followed by all lab occupants.

**Graduate Students, Student Research Assistants, Lab Technicians, and other Lab Staff**

All lab personnel are responsible for:

* Read, and be familiar with, and following all applicable protocols and guidelines.
* Work neatly and carefully.
* Use appropriate Personal Protective Equipment.
* Notify the PI or Lab Manager of all near misses and/or accidents in the lab.
* Notify the PI or Lab Manager of any hazardous conditions or unsafe work practices observed in the lab.

1. **General Requirements**

**29 CFR 1910.145 Appendix A (A) (1)**

“Laboratory personnel should conduct their work under conditions that minimize the risks from both known and unknown hazardous substances. Before beginning any laboratory work, the hazards and risks associated with an experiment or activity should be determined and the necessary safety precautions implemented.”

Hazard Assessment

Each lab must perform a lab hazard assessment that is reviewed annually and updated as needed. This hazard assessment includes inventories of hazardous materials and equipment, the hazards they present, and the controls used to minimize risks to lab personnel.

Perform a hazard analysis on each new process prior to its initiation, and include the hazard analysis in the standard operating procedure.

Contact HAZMAT if you need assistance with a hazard assessment.

Self-Inspections

Each lab/work space must conduct annual self-inspections. Semiannual, and quarterly self-inspections are encouraged for higher risk labs. Keep self-inspection results, and any resulting corrective actions in your safety binder.

Contact HAZMAT if you need assistance or wish to discuss issue resolution options.

Standard Operating Procedures

Each lab must have a standard operating procedure (SOP) for each piece of equipment, chemical, and type of radionuclide in the lab. Each SOP should outline the hazards associated with the material/equipment, prevention controls, potential accidents/releases and a procedure for dealing with each scenario. Please see the appropriate appendix for additional guidelines on the various hazards you will be dealing with while working in the lab.

Each lab must have a standard operating procedure (SOP) for each process performed in the lab. Attach the appropriate SOP’s for each material and piece of machinery used in the process.

All SOP’s should be reviewed and updated as necessary; annually, if a near miss or accident happens, if there’s a change in the process, the process is upscaled.

Prior to upscaling please contact HAZMAT for a safety review.

Please contact HAZMAT if you need assistance performing a hazard analysis.

Inventories

Each lab must maintain inventories of its contents. Each inventory must be updated at least once a year. Semiannually or quarterly is a preferred best management practice. Consider your hazard assessment when determining how often your inventory should be updated.

General Housekeeping

All materials and equipment must be stored in a way that is conducive to maintaining a safe environment. Fire codes require that all walkways, safety showers, eyewashes, fire extinguishers, electrical panels, and other safety devices must remain unblocked and easily accessible. Workbenches must be cleaned after each use, and spills must be attended to in a timely manner.

Service Animals in Labs

Service animals are welcome at NMT. However, service animals can, at times, pose a threat in a lab. Therefore, prior to bringing a service into a lab a hazard assessment must be performed for the health and safety of the other people in the lab, and the service animal in question.

**Students** needing to bring a service animal into a lab should contact student disability services who will work with HAZMAT to determine if, and under what conditions, it would be safe to bring the animal into the lab.

**Employees** needing to bring a service animal into a lab should contact the human resources department who will work with HAZMAT to determine if, and under what conditions, it would be safe to bring the animal into the lab.

If it is determined that it is not safe to bring the animal into the lab NMT will work to find other accommodations for that student or employee.

If at any time the service animal becomes a threat to the health and safety of people in the lab it must be removed, and its presence reevaluated.

Working Alone and Unattended Operations

Both working alone and having unattended operations create high risks in a lab. While not forbidden, these activities are highly discouraged. Please consult your department safety guide, lab safety binder and standard operating procedures for more information on these topics. Please contact HAZMAT if you need further guidance.

Electrical Safety

* Use power strips for computers.
* Never use an extension cord as a permanent solution. It is an unsafe to leave extension cords connected for extended periods of time.
* Never use a power strip or extension cord for a heat producing piece of equipment, these need to be directly plugged into the wall.

See the appropriate appendix for more detailed information on electrical safety, working with high voltage equipment, and lockout-tag out procedures.

In the event of a power outage follow your department and building emergency response team (BERT) plans.

Proper Use of Safety Controls

There is an established hierarchy of controls from most protective to least protective that must be followed to best protect lab personnel.

The hierarchy of controls are Elimination/Substitution, Engineering, Administrative, Personal Protective Equipment.

**Elimination/Substitution**- Can I do things differently to achieve my goal? Can I eliminate a dangerous step or substitute it with something else and still get a valid result? Substitution is often easier to do. For chemical and chemical process substitutions go to:

<http://ehs.mit.edu/greenchem/>

**Engineering Controls**- Examples of engineering controls are fume hoods, biosafety cabinets, glove boxes, snorkels, explosion proof devices etc. Engineering controls, when properly used, give you the next best level of protection after elimination and substitution.

**Administrative Controls**- These are procedural controls that help everyone work safely. Good housekeeping is an administrative control, as are standard operating procedures. A good standard operating procedure will have multiple administrative controls built into it.

**Personal Protective Equipment**- Despite all of the above, you often must wear appropriate PPE for full protection. Appropriate PPE, including type i.e gloves, appropriate material i.e. neoprene, and replacement procedures i.e at least every two hours, or if there is visible contamination on your glove, must be in the SOP. These are administrative controls that make the use of PPE safer. See the appropriate appendix for more information on PPE.

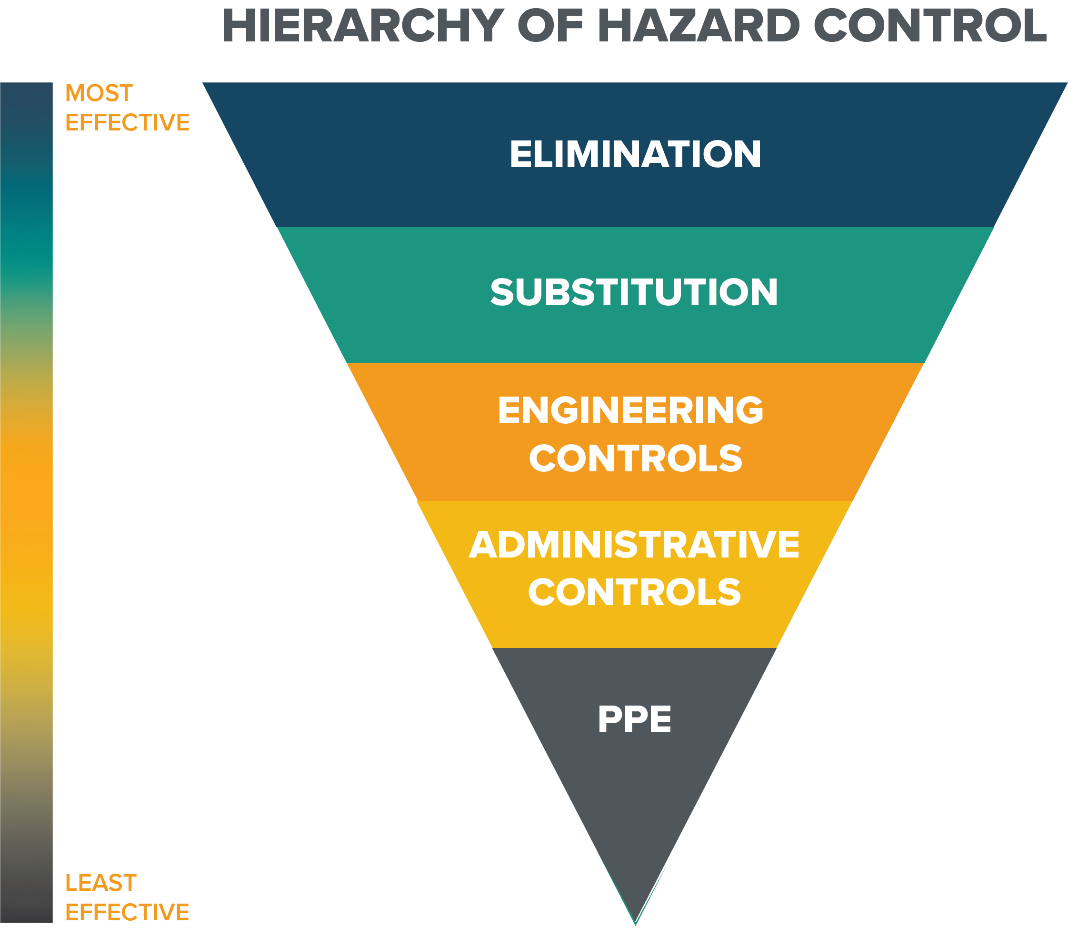


Figure 1. OSHA’s Hierarchy of Controls.

**Appendix A-Chemical Hygiene Plan**

**In addition to the information in this appendix, please consult your department safety guide, lab safety binder, standard operating procedure, safety data sheet, and manufacturers guidelines prior to working with chemicals in a lab. Never work with, or handle a chemical you have not been properly trained to handle/work with. Always follow the appropriate safety guidelines for any chemical you work with. Contact HAZMAT with any questions or concerns you may have regarding safe work with chemicals.**

1. Chemical Containers

All chemical containers must be in good condition, free of cracks, or holes with a tight fitting sealing cap. If either the container or cap are compromised, or show signs of potential breakthrough the chemical must be moved to a new container.

Prior to moving a chemical to a new container ensure the container is clean of any contaminants, compatible-won’t react with the chemical and is resistant to degradation by the chemical. Properly label the new container prior to carefully, with a funnel, transferring the contents.

Chemical container labels must have the name/s and concentration/s of the chemical/s it contains. This includes solution containers, beakers, and any and all other containers in a lab with chemical contents. Always label containers prior to adding the chemicals.

1. Empty Chemical Containers

Whenever possible, reuse your empty containers for your hazardous waste. Only use containers that held chemicals from the process the hazardous waste is derived from.

If you cannot reuse your container it must be properly disposed of. Most empty containers can go in the regular trash. The exception is P-listed (acutely hazardous) waste containers that must be disposed of as hazardous waste. For the P-list please go to:

<https://www.epa.gov/hw/defining-hazardous-waste-listed-characteristic-and-mixed-radiological-wastes#PandU>

Contact HAZMAT if you are unsure whether you’re chemical is P-listed.

For non P-Listed containers:

* Only dispose of empty containers, if there is visible residue that can be poured out place the container in your satellite accumulation area and request a waste pickup from HAZMAT.
* Keep the cap off the container.
* Make a hole in the container, as close to the bottom as possible to prevent it from being used by anyone else.
* With a black marker write “empty” on it.

For P-listed waste containers that cannot be reused, place them in your satellite accumulation area and request a waste pickup from HAZMAT.

1. Chemical Storage

All chemicals must be stored in a manner that, in the event of a breach, prevents incompatible chemicals from coming into contact with each other. Segregate storage areas by chemical type and compatibility. Where there is insufficient space to safely and properly segregate all chemicals, use secondary containment to create barriers between incompatible chemicals. Shelves holding chemicals must be permanently fixed and have at least a ¼ inch lip.

If you have 10 gallons or more of ignitable/flammable liquids, they must be stored in a flammable cabinet. Smaller amounts may be stored in a flammable cabinet.

If you have 10 gallons or more of corrosives, they must be stored in a corrosives cabinet. Never store acids and bases in the same corrosives cabinet. Smaller amounts may be stored in a corrosives cabinet.

Some flammable, and peroxide forming chemicals, require storage in a refrigerator or freezer. Follow the chemical manufacturers guidelines for storage temperatures.

Never store food or drink in a refrigerator/freezer that has or had chemicals in it.

To prevent dropping and breaking glass containers, never store a glass container above shoulder level of the shortest person working with that chemical. Transport chemical glass containers in unbreakable secondary containment.

Never store chemicals, or chemical waste, in a fume hood.

Liquid chemical containers must be inspected periodically as outlined in your department safety guide, and, or, lab safety binder. The lab safety binder must identify the person responsible for the periodic inspections. Keep a log of your inspections.

Expired chemicals are hazardous waste. Chemicals that require retesting and have not been retested are considered expired and are hazardous waste. Chemical manufacturers recommend testing chemicals without any associated dates after five years. Therefore, chemicals with no associated date that have not been retested after five years are hazardous waste. Chemicals that fail the retest are hazardous waste. All hazardous waste must be marked hazardous waste and kept in your satellite accumulation area. Contact your chemical manufacturer for more details on chemical retesting.

Always follow manufacturer recommendations for all chemical handling and storage requirements.

1. Peroxides and Peroxide Forming Chemicals

Peroxides and peroxide forming chemicals pose some of the most dangerous physical hazards in a lab. Peroxide forming chemicals must be tested at least every 6 months, or, more frequently if required by the manufacturer, and/or your department safety guide, and/or lab safety binder.

Always follow manufacturers guidelines for peroxide and peroxide forming chemical storage and retention times.

1. Chemical Handling

* Always work with the least hazardous chemical your process/experiment will allow.
* Always wear appropriate personal protective equipment (PPE) while handling chemicals, see the section on PPE and consult your department safety guide, lab safety binder, and SOP for additional information.
* Know where your safety shower, eyewash, fire extinguisher, spill kit, and any other safety equipment you may need are, how to access, and properly use them, before handling chemicals.
* Always open chemical containers in a fume hood to reduce exposure risks.
* Always tightly close chemical containers to prevent vapors from escaping.
* If you see any signs of degradation on the container or it’s cap notify your PI or Lab Manager immediately so the contents can be properly and safely transferred to an appropriate container.
* Transport chemicals in breakable containers with an unbreakable secondary containment vessel, and/or on a cart.
* Never handle a chemical you are not properly trained on.
* Never drink, eat, smoke or apply makeup while handling chemicals.
* Follow all the safety guidelines in this document, your department safety guide, your lab safety binder, the chemical safety data sheet, and standard operating procedure.
* Talk to your PI, lab manager, and/or HAZMAT about any safety concerns you may have.

1. Safety Data Sheets

The latest version of the Safety Data Sheet for all chemicals in a lab must be in the lab. Everyone who works in the lab must know where they are, and how to access them if they are in electronic format.

Always read and familiarize yourself with the contents of the safety data sheet prior to handling a chemical.

1. Personal Protective Equipment (PPE)

Long pants, safety glasses, and close toed shoes must be worn in labs at all times.

Minimal PPE for work with chemicals are:

* Lab Coat
* Safety Glasses
* Appropriate Gloves
* Long pants
* Close toed shoes

Your lab coat should be rated to protect you from the chemicals you work with. Use the most dangerous, and restrictive chemical/s you work with as your guideline. Check your SOP for the type of lab coat you should be wearing.

Safety glasses should be worn in labs at all times. If you wear corrective glasses, you need safety glasses that fit over your corrective glasses. Prescription safety glasses can be purchased, but, are not provided by the lab.

**Proper glove use** is as important as putting the gloves on. Never touch anything personal while wearing gloves. Do not touch door handles or anything that might be touched by someone at a later time without gloves. Do not reuse gloves. Even if you only wore them for a few minutes, if you touched a chemical container of any kind do not reuse your gloves as you will be contaminating yourself with whatever is on the used glove.

Always wash your hands after removing gloves.

Gloves should be made of an appropriate material for the chemical/s you work with. You may need different gloves for different procedure and/or you may want to double up on gloves for added protection. Be cognizant of your glove breakthrough time for each chemical you work with. Be cognizant of the fact that working with multiple chemicals may have a synergistic effect that cause breakthrough to occur sooner that it would working with a single chemical. Your SOP should have a glove change out schedule. For more information on breakthrough science see <https://vimeo.com/151051923>

Check with the chemical manufacturer on the best type of glove to use for that chemical and the breakthrough time on that glove for that chemical.

Here’s an example of four different gloves with the same chemical:

|  |  |  |
| --- | --- | --- |
| Chemical | Fabric/Material | Breakthrough Time in minutes |
| Hydrofluoric Acid | Tychem 4000 | 143 |
| Hydrofluoric Acid | Tychem 5000 | 126 |
| Hydrofluoric Acid | Tychem 6000 | 35 |
| Hydrofluoric Acid | Tychem 9000 | >480 |

Table 1. Source: Dupont SafeSpec.

General guide for glove selection:

|  |  |  |
| --- | --- | --- |
| Glove Material | Intended Use | Good For |
| Latex | Incidental Contact | Biological and water based materials |
| Nitrile | Incidental Contact | Solvents, oils, greases, and some acids an bases |
| Butyl Rubber | Extended Contact | Ketones and esters |
| Neoprene | Extended Contact | Acids, bases, fuels, peroxides, hydrocarbons, and phenols |
| Norfoil | Extended Contact | Most hazardous chemicals- fits poorly, no dexterity |
| Viton | Extended Contact | Chlorinated and aromatic solvents- expensive |
| Polyvinyl Chloride | Specific use | Acids, bases, oils, fats, peroxides, amines |

Table 2. Source University of California at Berkley.

Additional PPE may be required for some of the chemicals you work with, see your safety data sheet/s for manufacturers PPE recommendations for each chemical you work with. Examples of other PPE are, aprons, face shields, and safety shields.

1. Action Levels

Minimum action levels are OSHA Permissible Exposure Limits (PEL); OSHA 8-hour Time Weighted Average (TWA); and or OSHA Ceiling Exposure (CE). Departments, and PI’s, are encouraged to adopt stricter action levels. You must follow the strictest action level provided. Please consult with HAZMAT if you have questions or concerns.

Prior to working with a chemical you should know what your action level and IDLH (immediate danger to life and health) exposures are, as well as exposure routes, and exposure symptoms. Never work with a chemical you have not been properly trained on, or do not have proper engineering controls, administrative controls, and PPE for.

1. Spills

Each lab must have appropriate spill kits for the chemicals in the lab. Spill kits must be able to handle the largest volume of spill that may result in the lab.

Your chemical SOP’s must have a section on how to clean up any spill that may occur while handling the chemical. Follow the SOP guidelines to clean up the spill. If you are unable to clean up the spill, or your SOP does not allow you to do it yourself, leave the room and contact your PI or lab manager. Post warning signs and do not re-enter the room until your PI or lab manager give you permission to do so. Spills are the responsibility of the PI and lab manager. In their absence the department is responsible for spill mitigation.

Spill cleanup services can be obtained from any licensed contractor. NMT HAZMAT mainly works with:

AES, located in Belen, 505-861-1700.

Veolia, Located in Albuquerque, 505-355-4893.

Consult your department safety guide and lab safety binder for other options.

1. Fume Hoods

When properly used fume hoods provide good protection from chemical exposure. Improperly maintained fume hoods, and improper use of fume hoods create an unrecognized risk and false sense of security. Therefore, it is imperative that you properly maintain your fume hood and use it appropriately.

Fume hoods are not storage areas. If you must place large items in a fume hood for experiments raise them up to allow flow beneath them, this will help prevent eddy currents that disrupt fume hood performance.

ANSI allowable performance standards for fume hoods are 72-144 fpm. Optimal ranges are 80-120 fpm. HAZMAT inspects fume hoods for performance once a year. Tape a strip of Kimwipe (or similar product) to the bottom of your sash. The Kimwipe should be at approximately a 135° angle from the sash glass. If the Kimwipe is visibly higher or lower, please contact HAZMAT to have your fume hood tested.

Keep your fume hood as cleared of clutter as possible at all times. Never store chemicals of any kind in your fume hood.

For large items like ovens that need to be placed in a fume hood, raise the item a few inches up to allow air flow to the lower baffles. This will help the fume hood continue to operate as intended, reduce eddy currents, and reduce the likelihood of contaminants entering the labs breathable space.

General rules for fume hood work:

* Work with the sash at the optimal height marked on your fume hood by either the manufacturer, or, if there is no manufacturers stop, the height indicated by HAZMAT during the last performance test.
* Work at least six inches into the fume hood, aim as close to the center is reasonably achievable and comfortable for you.
* Never lean into the fume hood, only your protected hands and arms go into the fume hood.
* Use a stool to elevate yourself, or a low chair to lower yourself if there is a height issue that is causing you to work unsafely. Discuss the issue with your PI, Lab Manager, or HAZMAT if you cannot resolve it yourself.
* Keep your fume hood clean and uncluttered.
* Clean up spills as quickly as reasonably achievable.
* While you are working you may have your waste container in the fume hood for safe easy access if there is enough room to work safely with the container in the hood. However, never store your waste inside the fume hood. Fume hoods are not storage areas.
* Do not air out empty chemical containers in your fume hood.

1. Hazardous Waste

* All hazardous waste must be stored in the marked satellite accumulation area, in secondary containment.
* All hazardous waste must be clearly marked with the words “Hazardous Waste” and indicate what the hazard is.
* Each lab is allowed to have up to 55 gallons of hazardous waste, however, it is recommended that you have hazardous waste removed from your lab as quickly as possible once you are done with the experiment or the container is full. This includes any residual unused chemicals that you do not need for your next experiment.
* Never mix incompatible waste streams or place hazardous waste in a container that either contained an incompatible chemical, or, is constructed of a material that is incompatible with the waste stream.

Examples of properly filled out hazardous waste labels:

**HAZARDOUS WASTE**

Name: Ruth Horowitz

Location: Workman 255

Contents:\_30% MEK, 20% MeOh, 50% H2O

HAZARD: \_Ignitable and Toxic

Accumulation Start date: \_10/24/19

90/180 pickup date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**HAZARDOUS WASTE**

Name: \_\_Troylyn Zimmerly

Location: Workman 259

Contents: \_10% HCl, 90% H2O

HAZARD: \_Corrosive pH 2

Accumulation Start date: \_10/31/19

90/180 pickup date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

HAZMAT will fill in the 90/180 pickup date

The four HAZARD categories are: Ignitable (flammable), Corrosive, Reactive, and Toxic.

HAZMAT has some replacement waste containers, however, it is strongly recommended that you reuse empty chemical containers whenever possible. Notify HAMAT of your new container needs when requesting your waste pickup.

If you don’t have enough space to list all the contents on the container list them in the pick up request.

1. Respirators

Never use a respirator without proper medical testing, fit testing, and training. Contact HAZMAT at least 30 days prior to performing work for which a respirator may be required. All respirator use must be approved by HAZMAT. Respirators are a last line of defense as they are uncomfortable to work in, expensive, and require a lot of maintenance and care. See the Respiratory protection plan for more information.

1. Standard Operating Procedures

Standard Operating Procedures (SOPs) detail regularly recurring work processes that are conducted, or followed, within a department and, or, lab. They provide a working activity performance template, and facilitate performance consistency, data quality consistency, and provide health and safety information that protect lab personnel from exposures and injuries. In addition to assisting with maintaining quality control and quality assurance for processes, properly written SOPs help ensure compliance with state and federal regulations.

An incorrectly written SOP is of little value. Additionally, the best written SOP will fail if not followed. Therefore, the use of SOPs needs to be reviewed and re-enforced by Department Chairs, Principle investigators and Lab Managers on a regular basis. The most current copy of each SOP must be readily accessible for reference in the work areas of individuals actually performing the activity, either in hard copy or electronic format, otherwise the SOP serves little purpose.

SOP’s should be reviewed for revision

* Annually.
* In the event of a near miss to determine steps to prevent a future accident from happening.
* In the event of an actual incident to prevent reoccurrence.

In addition to process SOPs there should be an SOP for each chemical in the lab that can be attached to each process it is used for. You may choose to incorporate the chemical SOP directly into the process SOP.

Elements of a chemical SOP are:

* Name of the chemical, CAS number, and UN number.
* A brief description of the chemical composition and its properties.
* Storage requirements.
* Immediate Danger to Life and Health (IDLH) exposure.
* Associated OSHA PEL/TWA/CE any and all that apply.
* Exposure action level.
* Exposure routes.
* Exposure symptoms.
* First aid activities in the event of an exposure.
* Spill cleanup procedures, for small, medium, and large spills, whichever are applicable to the contents in the lab.
* Emergency contact numbers.
* Emergency procedures.

1. Equipment Decontamination

All equipment that held chemicals must be decontaminated prior to being picked up by Property. Prior to decontamination, wipe down the equipment to remove any debris, and dust.

* Have a list of the chemicals that were stored or used.
* For toxic chemicals, check with the manufacturer for additional decontamination requirements.
* Follow the table below, when in doubt contact the chemical manufacturer for more guidance:

|  |  |
| --- | --- |
| Contaminant | Decon Agent |
| Low chain hydrocarbons  Inorganic compounds  Salts | Water |
| Bases  Amines  Hydrazines | Dilute acid |
| Acids  Phenols  Thiols | Dilute base such as detergent |
| Non polar compounds | Alcohol |

Table 3. Source: OSHA online

Multiple rinses with clean solutions remove more contaminants than a single rinse with the same volume of solution. Rinsing with large volumes will remove even more contaminants than rinsing with a lesser total volume.

Not all contaminants leave visible traces, therefore, after decontamination, equipment cannot be considered for storage or use with food or drink or any use that would put it in contact with children, or, the elderly. Provide property with the list of potential contaminants for disclosure to potential purchasers of the equipment.

1. Lab Decommissioning

Prior to relinquishing lab space the lab must be decommissioned for the health and safety of future occupants. Contact HAZMAT if you need additional guidance.

* Properly dispose of all chemicals. Proper disposal includes removal for disposal by HAZMAT, or, donating to another lab that needs it.
* Wipe down all benches and other workspaces with appropriate decon agent/s.
* Decontaminate all equipment. If you no longer need the equipment have it picked up by property or donated to another lab that needs it.
* Contact HAZMAT for a walkthrough.

**Appendix B – Compressed Gasses**

**Users of Compressed gas shall become familiar with the properties and inherent hazards of the products they use. CGA P-1—2015 (1).**

**The handling storage, and utilization of all compressed gases in cylinders shall be in accordance with Compressed Gas Association Pamphlet P-1. 29 CFR 1910.101 (b).**

Under Construction

**Appendix H-SOP Template**

**Standard Operating Procedure**

**[Chemical/Process/Equipment Name]**

***This is an SOP template and is not complete until:*** *1) lab specific information is entered into the box below 2) lab specific protocol/procedure is added to the protocol/procedure section and   
3) SOP has been signed and dated by the PI and relevant lab personnel.*

Print a copy and keep with your   
*Chemical Hygiene Plan* and/or *Lab Safety Binder*

|  |  |
| --- | --- |
| **Department:** | Click here to enter text. |
| **Date SOP was approved by PI/lab supervisor:** | Click here to enter a date. |
| **Principal Investigator:** | Click here to enter text. |
| **Lab Safety Coordinator/Lab Manager:** | Click here to enter text. |
| **Lab Phone:** | Click here to enter text. |
| **Office Phone:** | Click here to enter text. |
| **Emergency Contact:** | Click here to enter text. |
| *(Name and Phone Number)* |
| **Location(s) covered by this SOP:** | Click here to enter text. |
| *(Building/Room Number)* |

**Type of SOP:** ☐ Process ☐Hazardous Chemical ☐Equipment

1. **Purpose**

[Identify the intended use of a process/equipment/chemical]

1. **Procedure/Scope:**

[Identify when the procedure is to be followed]

[Include laboratory procedure and specify hazardous stages of the procedure]

1. **Physical & Chemical Properties/Definition of Chemical Group [ only applies to processes using chemicals]**

CAS#: [Insert CAS Number] UN#: [Insert CAS Number]

Class: [Toxic, Corrosive, Caustic, Radioactive, Poison Inhalation Hazard, Oxidizer, Flammable, Explosive, Cryogenic Liquid, Pyrophoric Liquid, etc.]

IDLH: [ *if applicable*]

TWA/PEL/REL [ specify which one you have and the associated exposure limit]

Action Level [consult your department safety guide and lab safety guide for your action level]

1. **Safety Data Sheet (SDS) Location**

Specify where the SDS is located in the lab

1. **Personal Protective Equipment (PPE) (Describe the correct PPE for working with the chemical or needed during the process)**

Laboratory personnel must always wear a lab coat, safety glasses and closed-toed shoes are required at all times when working in a lab.

**Hand Protection**

**Eye Protection**

**Skin and Body Protection**

**Respiratory Protection [requires prior review and approval from HAZMAT]**

1. **Equipment and Supplies**

[List any equipment or supplies need for the procedure above.]

1. **Engineering Controls**

[Describe the engineering controls that will be implemented in your laboratory when working with the specific chemical. (i.e. working in a fume hood)]

1. **First Aid Procedures**

* Use the recommended procedures on the SDS to fill out this portion. If the information is not on the SDS contact the chemical manufacturer for the information.

**If inhaled**

[Describe the response plan in the event that someone inhaled a hazardous substance]

**In case of skin contact**

[Describe the response plan in the event that someone’s skin comes in contact with a hazardous substance]

**In case of eye contact**

[Describe the response plan in the event that someone’s eye/s comes in contact with a hazardous substance]

**If ingested**

Contact 911 and/or poison control center if swallowed: 1 (800) 222-1222

[Describe the response plan in the event that someone ingests a hazardous substance]

1. **Special Storage & Handling Requirements**

[Include information for any special storage or handling (i.e. pyrophoric chemicals or cryogenic liquids)]

**Handling**:

[Example: wash hands after handling, use only within fume hood, wear gloves while handling, etc.]

**Storage:**

[Example: do not store flammables next to oxidizers, store in a cool dry location, store in secondary container, etc.]

**Transporting:**

[Example: transport with secondary container, always follow labeling requirements, etc..]

1. **Chemical Spill**

**General Guidelines**

**For spills less than 1 gallon in size, low hazard chemicals:**

Preparation: Ensure employees have adequate Personal Protective Equipment and spill control materials before attempting to clean up a spill

1. Assess the magnitude of the spill and the associated hazards (broken glass, toxic fumes, risk of fire, etc.).

2. If the hazards can be safely mitigated with available personal protective equipment (PPE), do so. This includes informing co-workers of the spill, removing ignition sources, and moving equipment that may be damaged by the spilled chemicals. (Note: If the spill is more than 1 -gallon of liquid or 1 pound of solid, contact Campus Police at 575-835-5555 and ask them to notify HAZMAT.)

3. Once all hazards have been assessed, put on appropriate PPE (respiratory protection, goggles, body protection, gloves, impervious shoes/boots, etc.).

4. Apply the Pig Pads to the spill and give the pads time to absorb the chemical.

5. Use gloves and cardboard to move the used Pig Pads to a garbage bag. 6. Seal the garbage bag with a zip tie and label the bag with a Hazardous Waste Label.

7. Place the garbage bag in secondary containment (a cardboard box or plastic tote/bin) labeled “Hazardous Waste.” Place the box in your satellite accumulation area.

8. Request a Hazardous Waste Pickup ruth.horowitz@nmt.edu.

9. Replenish you spill kit’s contents immediately.

**For spills greater than 1 gallon in size, high hazard chemicals:**

1. In general, if a chemical spill is greater than 1 gallon in volume or is a particularly hazardous material (strong acid or base, carcinogen, highly reactive chemical, etc.), consult your Department Safety Guide for the preferred contractor, call Campus Police (575-835-5555) if a safety perimeter is required, NMT does not have the personnel or resources to clean up a large spill internally, however HAZMAT should be notified of all large spills immediately in order to assist the contractor and provide additional guidance 575-????????

2. Provide the following information:

o Your name and contact phone number

o Location of the spill (Building and room number)

o Approximate volume of spilled liquid

o Name of chemical

3. Do not attempt to clean up large and/or hazardous chemical spills.

-4. Notify all other workers who could be affected by the spill and vacate the laboratory/floor/building, particularly if the chemical produces hazardous fumes or poses other potential health hazards.

5. Wait at the building entrance for HAZMAT personnel.

6. Serve as a point of contact and provide information about the spill, as requested by HAZMAT.

**Personal precautions**

[Include information and PPE that may be needed for the person responsible for cleaning the spill.]

**Environmental precautions**

[Include information on how the process or chemical might alter the surrounding environment.]

**Methods and materials for containment and cleaning up**

 Appropriate neutralizing agent [specify what it is]

 Appropriate sized bucket with screw-on lid

 Absorbent Pads [minimum 6, more if over a gallon ay spill, if there is a potential for more than 2 gallons have some spill booms to prevent spreading.

 Heavy duty black plastic garbage bags  Zip ties (to seal garbage bags)

 Hazardous Waste Labels

 Cardboard rectangles/squares for handling used pads, if necessary

 Appropriate lab-specific PPE, such as lab coats, goggles, gloves, etc., should be available in each laboratory

1. **Other Emergencies**

**Medical Emergency Dial 911**

**Life Threatening Emergency, After Hours, Weekends and Holidays** – Dial **911**

**Non-Life Threatening Emergency** – [Instructions on how to handle a non-life threating chemical exposure, process injury, or procedural injury.]

1. **Decontamination/Waste Disposal Procedure**

*General hazardous waste disposal guidelines:*

**Label Waste**

* Properly label all hazardous waste containers before adding waste to the container.

**Store Waste**

* Store hazardous waste in tightly closed containers, in secondary containment, and in the designated satellite accumulation area.

1. **Calibration/Settings: (For equipment SOP)**

[Describe who is responsible calibration and if the equipment needs to be calibrated.]

[Describe the settings the equipment must be on to get desire results.]

1. **Repair & Maintenance: (For equipment SOP)**

[Contact information for repairs or in case of a malfunction.]

1. **Physical Hazards (For equipment SOP)**

[Describe the physical hazards associated with use of the equipment]

1. **First Aid and Emergency Response**

[Describe the actions to be taken in the event of each potential physical harm]

1. **References**

[Include any references useful to employees]

1. **Training Requirements**

[Example: lab safety training, laser safety training, radiation safety training, hazard communication/SDS, lab-specific training, this SOP, etc.]

**Documentation of Training** (signature of all users is required)

* Prior to conducting any work with [chemical/process/equipment name] designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance/equipment, work area decontamination, and emergency procedures.
* The Principal Investigator must provide this SOP and a copy of the SDS (can be available online) available to all laboratory personnel.
* The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training and/or refresher training.

**Principal Investigator SOP Approval**

By signing and dating here the designee certifies that the Standard Operating Procedure (SOP) for *Insert SOP Name* is accurate and effectively provides standard operating procedures for laboratory personnel.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature Printed Name/Title Date

I have read and understand the content of this SOP:

|  |  |  |
| --- | --- | --- |
| **Name** | **Signature** | **Date** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |