Chemical & Biological Hygiene Program

Environmental, Health & Safety Office
January 2018

Contents

1. PURPOSE

Protecting the health and safety of every person on the Texas A&M University-Texarkana campus is of paramount importance, and it is a continuous work in progress. The A&M-Texarkana Chemical & Biological Hygiene Program (CBHP) constitutes written standard operating procedures designed to ensure laboratory operations are carried out in a manner that protects faculty, staff, students, and visitors from harmful exposures associated with hazardous chemicals, as well as complying with state and federal regulations and the Texas A&M University System Laboratory Standard.

In Texas, the disposal of biohazardous waste is regulated by the Texas Department of Health and the Texas Commission on Environmental Quality. Local regulations of the City of Texarkana, TX, also apply to all waste that will be disposed in the New Boston Landfill (e.g., TAMUT trash dumpsters).

2. OBJECTIVES

The A&M-Texarkana Chemical & Biological Hygiene Program shall be used in all current and future laboratories. The program will be continuously reviewed and updated as needed and/or required. The safety and well-being of all persons will be protected by our dedication to achieving the following goals:

2.1 Provide the necessary facilities, staff, and equipment to operate in the safest manner possible.
2.2 Reduce or minimize the extent of chemical exposure.
2.3 Follow all aspects of the Chemical & Biological Hygiene Program.
2.4 Provide adequate ventilation to all laboratories.
2.5 Observe the Threshold Limit Values (TLVs) for all chemicals.
2.6 Ensure the chemical inventory in labs is maintained in a manner that ensures only the least amount of required chemicals are on hand for the specific needs of the department, as well as constant monitoring of the inventory to dispose of chemicals that have reached the end of their viable life.
2.7 Protect the environment from hazardous chemicals and chemical waste.
2.8 Inspect all laboratories on a periodic basis to ensure all of the above goals are being met.

3. RESPONSIBILITIES

The Dean, Laboratory Hygiene Officer (LHO), the Principal Investigator (PI), faculty member or other person with operational responsibility shall assure compliance with these requirements within his/her laboratory or area of responsibility.

The A&M-Texarkana President has the ultimate responsibility for the Chemical & Biological Hygiene Program within the University and must provide continuing support for institutional chemical and biological hygiene.

3.1 Laboratory Hygiene Officer

The Laboratory Hygiene Officer (LHO) is appointed by the Dean of the College of Arts, Sciences and Education, and shall be responsible for all aspects of laboratory safety. The LHO will collaborate with the Dean, the Principal Investigator (PI), and the Environmental, Health & Safety (EHS) Office on developing and implementing hygiene programs and in developing standard operating procedures related to hygiene, laboratory safety, and emergency response.

3.1.1 Specific responsibilities include:

3.1.1.1 Reviewing the CBHP on an annual basis, ensuring it is continuously updated as to current chemical safety procedures.

3.1.1.2 Monitoring the purchase, use, and disposal of chemicals used in laboratory procedures.

3.1.1.3 Ensuring all lab personnel and students are properly trained in the use of hazardous chemicals.

3.1.1.4 Maintaining documentation of training.

3.1.1.5 Ensuring all personnel and students know and follow the rules of laboratory safety.

3.1.1.6 Ensuring engineering controls are operative and personal protective equipment is properly selected, used, and maintained.

3.1.1.7 Ensure professors are made aware of the specific hazards for new chemicals introduced into the labs and that the professors train students on these hazards prior to their use.

3.1.1.8 Ensuring Safety Data Sheets are available for each hazardous chemical found in the laboratory.

3.1.1.9 Seeking ways to improve laboratory safety.

3.1.1.10 Filing written reports to the University President, the Environmental Management Advisory Council, and the EHS Office concerning any chemical spill, accident, or injury that occurs in the laboratory.

3.1.1.11 Ensuring regular hygiene and housekeeping inspections are performed.

3.1.1.12 Understanding and keeping current of all legal requirements concerning hazardous chemicals.

3.1.1.13 Ensuring laboratory equipment is properly maintained and in good working order.

3.2 Principal Investigator

The primary researcher will assume the role of Principle Investigator (PI). The PI will work alongside the LHO in developing and implementing the Chemical & Biological Hygiene Program. The PI is responsible for the health and safety of all personnel under their direction.

3.3 Employees/Students

3.3.1 All laboratory employees and students are responsible for:

3.3.1.1 Knowing and following the proper safety procedures in the CBHP.

3.3.1.2 Reporting all hazardous conditions to the lab supervisor.

3.3.1.3 Wearing the prescribed personal protective equipment (PPE).

3.3.1.4 Reporting any injury, illness, or chemical spill to the lab supervisor/LHO.

3.3.1.5 Requesting information and/or training when unsure of how to handle a hazardous chemical.

4. STANDARD OPERATING PROCEDURES

This document represents an initial minimum set of guidelines for the handling of hazardous chemicals in A&M-Texarkana laboratories. A hazardous chemical can be defined as any chemical that poses a physical or health hazard to the user. As the University grows individual administrative units, laboratories, or research groups are expected to develop more detailed procedures as their individual situations warrant.

4.1 General Guidelines

Every laboratory worker shall observe the following guidelines:

4.1.1 If an injury occurs in the lab that requires medical attention, call 911 immediately.

4.1.2 Students working in laboratories must be supervised by a lab employee or trained lab assistant.

4.1.3 If a toxic/hazardous chemical comes in contact with the skin, immediately begin flushing the area with water and continue to do so for at least 15 minutes or until medical assistance arrives.

4.1.4 Know the safety rules and procedures that apply to the work being performed. Review potential hazards and take the appropriate safety precautions before beginning any new operation.

4.1.5 Become familiar with the location and use of: fire extinguishers, eyewash stations, emergency showers, fire exits, evacuation routes, emergency shut off and purge buttons, and fire alarm pull stations.

4.1.6 Become familiar with the types of personal protective equipment (PPE) available and understand its use and limitations. Always wear the required PPE while in a lab setting.

4.1.7 Use only the chemicals for which you have the appropriate exposure controls (such as a chemical fume hood) and appropriate training.

4.1.8 Only A&M-Texarkana approved employees, students, and their visitors are allowed in A&M-Texarkana laboratories.

4.1.9 Make sure all equipment is in good working order before using hazardous chemicals.

4.1.10 Use hazardous chemicals and all lab equipment only as directed or for their intended purpose.

4.2 Operations Requiring Prior Approval

The LHO must give prior approval and be ultimately responsible for any laboratory activity that presents a foreseeable hazard to employees, students, or structures. This would include such operations as working alone, conducting unattended experiments, and conducting particularly hazardous experiments.

4.2.1 Unattended operations – Unattended experiments must be approved by the LHO. The employee performing the experiment must design procedures to prevent the release of hazardous substances in the event of an interruption of utility services, such as cooling water and/or electricity. Lights should be left on and signs posted identifying the nature of the hazardous substance in use.

4.2.2 Working alone – Undergraduate students are not allowed to work in laboratories without the supervision of an A&M-Texarkana lab employee. A graduate student whom is conducting independent research and has been approved by the PI and LHO may work alone.

4.2.2.1 An advisor, lab attendant, or the LHO must be in the building at all times any student is working on a research project. The location of the advisor, lab attendant, or the LHO must be known to the student in case of emergency.

4.2.2.2 It is advisable for lab employees to always avoid working alone (conducting experiments, tests, etc.) in a laboratory. If an employee must work alone for some reason, prior approval must also be given by the LHO. Experiments known to be of a particularly hazardous nature shall never be undertaken by anyone while working alone.

4.2.3 Hazardous materials – Very hazardous materials, such as carcinogens, reproductive toxins, and chemicals with a very high degree of acute toxicity will not be purchased or used without prior written approval from the LHO. The LHO must weigh the need for conducting operations using these types of chemicals with the degree of risk of exposure to staff and students. If the risk outweighs the need, the LHO shall deny the request.

4.3 Emergency Eyewash/Safety Showers

Emergency eyewash stations and safety showers are located in each A&M-Texarkana laboratory. These stations should be kept free of any obstruction that might inhibit their use. Eyewash stations and safety showers should be tested on a monthly basis to verify the units are in proper working order and to flush the lines of stale water and debris. The LHO is responsible for ensuring these stations are checked. Documentation of the date and initials of the person that performed the check shall be kept by the LHO.

4.4 Equipment

Only use the proper equipment for each task and ensure that equipment is in good working order. All glassware should be handled, used, and stored with the utmost care to prevent chips, cracks, and breakage. Cracked or chipped glassware should never be used for any task, but disposed of in the proper manner.

4.5 Fire Extinguishers and First Aid Kits

Each laboratory will be equipped with fire extinguishers and first aid kits. Employees must be trained in the use of fire extinguishers before they may use it to fight a fire. Fire extinguishers shall be mounted on an interior lab wall in a highly visible and accessible area. Each extinguisher will be checked monthly and maintained by a qualified technician annually to ensure it is in good working order. First aid kits will be checked by the EHS Office during regular campus-wide first aid kit checks to replenish supplies as needed.

4.6 Horseplay

Horseplay and practical jokes are not permitted in the laboratory. While these activities may be a source of good fun in the appropriate place, they become dangerous in laboratory settings where hazardous chemicals are used. These types of activities will not be tolerated and could result in the expulsion of the offender from the laboratory.

4.7 Housekeeping

There is a definite relationship between safety and orderliness in all areas of life. If housekeeping standards fall, the likeliness of having a safe environment deteriorates. All laboratory work areas must be kept clean and clear of obstructions and clutter. Floors must be kept clean and dry and all halls and aisles shall remain clear of boxes or other items that could be trip hazards. All laboratory wastes shall be kept in appropriate containers and labeled accordingly.

4.8 Safety Data Sheet

A Safety Data Sheet (SDS) should be the first source of information about the hazards associated with any chemical. SDSs contain the following information:

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.
Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.
Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.
Section 4, First-aid measures includes important symptoms/effects, acute, delayed; required treatment.
Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.
Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.
Section 8, Exposure controls/personal protection lists Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the SDS where available as well as appropriate engineering controls; personal protective equipment (PPE).
Section 9, Physical and chemical properties lists the chemical's characteristics.
Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.
Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.
Section 12, Ecological information*
Section 13, Disposal considerations*
Section 14, Transport information*
Section 15, Regulatory information*
Section 16, Other information, includes the date of preparation or last revision.

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

Employers must ensure that SDSs are readily accessible to employees.

Manufacturers are required to provide an SDS for each chemical product they sell. An SDS book will be placed in a conspicuous place in the A&M-Texarkana laboratory. The EHS Office maintains an online database of SDSs for every hazardous chemical on campus. If you are using a chemical that you cannot find an SDS for, contact the LHO and one will be provided for you.

4.9 Personal Protective Equipment and Personal Hygiene

Personal Protective Equipment (PPE) and personal hygiene are basic aspects of laboratory safety. The LHO is responsible for the selection, procurement, care, and replacement of all personal protective equipment. The following guidelines will minimize exposure to hazardous chemicals during routine use and in the event of an accident.

4.9.1 Appropriate Clothing – Skin and body protection involves wearing protective clothing over all parts of the body that could become contaminated with hazardous chemicals. It is recommended that employees/students wear long-sleeved/long-legged clothing to minimize exposed skin surfaces. A lab coat shall be worn over street clothes and shall be laundered regularly or disposed of in the trash. Lab coats are intended to prevent contact with dirt, chemical dusts, and minor chemical splashes or spills. If they become contaminated, they should immediately be removed and the affected skin surface washed thoroughly. Sandals or open-toed shoes shall not be worn. Long hair and loose clothing shall be confined.

4.9.2 Protective Clothing – Additional protective clothing may be required for some types of procedures or with specific substances. This may include impermeable aprons and gloves as well as plastic coated coveralls, shoe covers, and arm sleeves. These garments can be either washable or disposable. The choice of garments depends on the degree of protection required and the areas of the body which may be contaminated.

4.9.3 Eye Protection – Eye protection is required for all personnel and any visitors present in locations where chemicals are handled and a chemical splash hazard exists. Safety glasses,

goggles, and full face shields are the three main types of eye protection. The degree of protection required is dependent on the type chemical(s) being used. Safety glasses shall be worn when using any chemical. Safety goggles should be worn in situations where bulk quantities of chemicals are being handled and chemical splash to the face is possible. Goggles and full face shields should be worn when handling highly reactive substances or large quantities of hazardous chemicals, corrosives, poisons, or hot chemicals. All eye protection shall meet the requirements of the American National Standards Institute (ANSI) standard, Z87-1. An SDS will list the recommended PPE for use with each chemical.

4.9.4 Glass Tubing – When inserting tubing into stoppers, lubricate tubing and wear leather gloves to protect hands from being cut in the event of the tubing breaking.

4.9.5 Gloves – Gloves are essential when working with hazardous substances. The proper gloves will prevent skin absorption, infection, or burns. Chemical resistant gloves should be worn whenever the potential for contact with corrosive or toxic substances and substances of unknown toxicity exist. Glove selection is based on the type chemical being handled, the particular hazard involved, and the glove's suitability for the operation being conducted. Before each use, gloves should be checked for integrity. Gloves should also be rinsed before removal whenever possible to prevent skin contamination. Non-disposable gloves should be replaced periodically, depending on frequency of use and their resistance to the substances being handled.

4.9.6 Personal Hygiene – Hands should be washed frequently throughout the day, after glove removal, before leaving the lab, after contact with any hazardous material, and before eating, drinking, smoking, or applying cosmetics.

4.9.7 Respiratory Protection – Inhalation hazards can be controlled using ventilation or respiratory protection. Check the chemical label and SDS for information on a substance's inhalation hazard and special ventilation requirements. When a potential inhalation hazard exists, the label or SDS will contain special warnings. Take appropriate precautions when handling these substances. Controlling inhalation exposures through engineering controls (ventilation) is always the preferred method. As with other PPE, respiratory protection relies heavily on employee work practices and training to be effective.

4.9.8 Respirators – A&M-Texarkana does not use any chemicals at this time requiring the use of a respirator. In the future, if it becomes necessary to use chemicals requiring respirators, a Respiratory Protection Program will need to be put in place before the chemical can be introduced into the lab or any other area of the University.

4.10 Hazard Assessments

Before any task involving hazardous materials or physical hazards is performed, the instructor should conduct a written hazard assessment for the project. Tasks involving similar hazards may be grouped together in a single assessment. The hazard assessment should not be limited to chemical hazards, but should also include issues such as radiation hazards, biological hazards, temperature hazards, and physical hazards.

5. LABORATORY CHEMICALS

5.1 Chemical Procurement

The PI for any laboratory shall establish guidelines for the procurement of all lab chemicals and shall be responsible for all hazardous chemicals purchased for A&M-Texarkana laboratories. Requests for new chemicals must be submitted to the LHO for approval before purchasing. All employees involved in the receiving of chemicals should be informed about proper handling, storage, and disposal procedures. Chemicals should not be accepted without accompanying labels, SDS, and proper packaging. Damaged or leaking containers shall not be accepted for any reason. All chemicals should be dated upon receipt and dated when opened.

5.2 Chemical Classifications

5.2.1 Flammable and combustible

Flammable substances are those that readily catch fire and burn in air. Flammable liquids are those that have a flash point (lowest temperature at which liquid produces enough vapor to ignite) below 100° F and a vapor pressure that does not exceed 40 pounds per square inch (psi) at 100° F. In addition to liquids, flammable substances are also solids and gases. Examples of flammable gases are acetylene, ethylene oxide, and hydrogen. Flammable solids are those that are capable of producing fires as a result of friction or heat retained from production or that, if ignited, produce a serious transportation hazard. A combustible liquid is one which has a flash point at or above 100° F. Organic acids are combustible materials, with many being liquids.

5.2.1.1 Explosives

Explosive gases and solids are also part of the flammable and combustible group. Light, mechanical shock, heat, and certain other catalysts can act as initiators of explosive reactions. One example of explosive mixture is a suspension of oxidizable particles – such as magnesium powder or zinc dust – in air. Explosives include nitrates, chlorates, perchlorates, and picrates.

5.2.1.2 Pyrophorics

Pyrophoric chemicals are those substances that react so rapidly with air and its moisture that the ensuing oxidation and/or hydrolysis lead to ignition. Ignition can be instantaneous, delayed, or occur only if the material is finely divided or spread in a diffuse layer. Some examples are: finely divided metals, such as calcium, magnesium, and zirconium; metal or non-metal hydrides, such as germane and diborane; alkylated metal alkoxides; or non-metal halides, such as diethylethoxyaluminum. Spontaneous ignition or combustion occurs when a substance reaches its ignition temperature without the application of external heat. Substances capable of spontaneous combustion include alkali metals, such as sodium and potassium; finely divided pyrophoric metals; and phosphorus.

5.2.1.3 Water-reactive substances

Water sensitive compounds react exothermically and violently with water, particularly if it is present in limited quantities, since no significant cooling effect will occur. Some examples of water-reactive chemicals would include alkali and alkaline earth metals, such as potassium and calcium; and anhydrous metals halides, such as aluminum bromide and germanium chloride.

5.2.1.4 Peroxidizable substances

Peroxidizable substances slowly react under ambient conditions with atmospheric oxygen to initially form peroxides. Some peroxide formers are ethers, liquid paraffins, and olefins. Peroxides are extremely sensitive to shocks, sparks, or other forms of accidental ignition. Since these chemicals are packaged in an air atmosphere, peroxides can form even though the packages have not been opened. Unless an inhibitor was added by the manufacturer, sealed containers of ethers should be periodically tested for the presence of peroxides and discarded within 18 months of receiving or upon a positive test for the presence of peroxides. It is very important to date such containers upon receipt and opening.

5.2.2 Corrosives

Corrosives include strong acids, strong bases, dehydrating agents, and oxidizing agents. These chemicals can erode the skin, damage the eyes, and cause severe bronchial irritation. When handling these chemicals rubber gloves, aprons, safety glasses, and face shields must be used.

5.2.2.1 Strong acids

All concentrated acids can damage the skin and eyes. Nitric, chromic, and hydrofluoric acids are particularly damaging because of the types of chemical burns they inflict.

5.2.2.2 Strong bases

Common bases include sodium hydroxide, potassium hydroxide, and ammonia. Metal hydroxides are extremely damaging to the eyes.

5.2.2.3 Dehydrating agents

Strong dehydrating agents include concentrated sulfuric acid, sodium hydroxide, phosphorous pentoxide, and calcium oxide. These substances can cause severe burns on contact with the skin because of their affinity for water.

5.2.2.4 Oxidizers

Oxidizers can be defined as any material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials.

5.3 Chemical Transporting

Transporting chemicals should always be handled in a manner that ensures the safety of all personnel. Carts used for transport should be sturdy and have a substantial rim around the edge. Glass bottles must be protected during transportation within the building. Use bottle carriers for transporting chemicals which are in glass containers. Safety-coated glass bottles can be purchased from the manufacturer. Beakers and flasks should be grasped by the body, not by the lid. When hand carried, they should be placed in an acid bucket to protect against spillage or breakage. Jars of solids should be moved in plastic bins. Close caps securely and avoid storing chemical containers in hard to reach areas. Pour chemicals carefully and never add water to concentrated acid. Containers holding more than five (5) gallons should be grounded when transferring flammable liquids.

5.4 Chemical Storage

The proper storage of chemicals is very important for the health and safety of all laboratory staff. Improper storage can result in hazardous situations that can endanger laboratory workers as well as campus property.

The following is a list of important safety rules for the storage of chemicals:

5.4.1 Never store chemicals solely by alphabetical order; segregate according to hazard class and then place alphabetically.
5.4.2 Never store liquids above eye level.
5.4.3 Store especially hazardous chemicals in a secondary container.
5.4.4 Do not store usable chemicals in any fume hood.
5.4.5 Waste chemicals should be collected in a designated fume hood. Waste chemicals must be properly sealed and labeled, and the LHO must be notified. The total volume of stored waste is not to exceed 5 gallons.
5.4.6 Return chemicals to their storage areas when they are no longer needed.
5.4.7 Flammable chemicals that should be refrigerated must be stored in an approved, explosion-resistant refrigerator that is labeled as such.
5.4.8 Never stack bottles on top of one another.
5.4.9 Never store chemicals anywhere other than an approved storage area.
5.4.10 Label all chemical containers with the date of receipt and date of opening.

5.5 Inventory Control

Proper inventory control is essential in the laboratory. The security of the laboratory chemical inventory rests with the lab PI. All PIs are required to inventory their chemicals when they initially set up their labs. Chemicals that are inherited with the lab should be disposed of if they are no longer of any use. If a chemical is moved it is the responsibility of the PI or faculty member to inform the LHO. Subsequent shipments of chemicals must be dated and included on the chemical inventory list when they are received. The PI and LHO shall also conduct an inventory every semester of all chemicals on hand. A copy of this inventory shall be maintained in the laboratory and a copy shall be sent to the EH&S Office. Additionally, the following principles should be applied in an effort to keep an accurate track of laboratory chemicals.

5.5.1 Chemicals must be purchased in limited amounts. A (6) six-month supply, or less, is generally the preferred amount.

5.5.2 Information about every chemical received, such as date received, manufacturer, and quantity shall be recorded on a chemical inventory form.

5.5.3 Chemicals should be examined every semester. During this inspection, those chemicals which have the following conditions should be disposed of using proper procedures: chemicals kept beyond their shelf life, deterioration of the chemical, questionable labels or no labels, leaking containers, and corroded caps.

5.6 Special Considerations

In addition to the general requirements for storing chemicals, various groups of chemicals have special considerations.

5.6.1 Flammable and combustible liquids

The National Fire Protection Association Standard on Fire Protection for Laboratories Using Chemicals (NFPA 45) sets the maximum allowable size of container for the storage of flammable and combustible liquids in laboratories.

Flammable Liquids

IA fp<73°F (22.7°C) bp < 100°F (37.4°C)
IB fp<73°F (22.7°C) bp > 100°F (37.4°C)
IC fp>73°F (22.7°C) bp < 100°F (37.4°C)

Combustible Liquids

Class II fp>100°F (37.4°C) < 140°F (60°C)
Class IIIA fp>140°F (59.4°C) < 200°F (93.3°C)
Class IIIB fp>200°F (93.3°C)

Container Type	Flammable Liquids			Combustible Liquid	
	IA	IB	IC	II	IIIA
Glass	500ml (1 pt)	1L (1 qt)	4L (1.1 gal)	4L (1.1 gal)	20L (5 gal)
Metal (non-drum)	4L (1.1 gal)	20L (5 gal)	20L (5 gal)	20L (5 gal)	20L (5 gal)
DOT approved plastic	4L (1.1 gal)	20L (5 gal)	20L (5 gal)	20L (5 gal)	20L (5 gal)
Safety cans	10L (2.6 gal)	20L (5 gal)	20L (5 gal)	20L (5 gal)	20L (5 gal)
Metal drum	not allowed	20L (5 gal)	20L (5 gal)	20L (5 gal)	20L (5 gal)
Polyethylene	4L (1.1 gal)	20L (5 gal)	227L (60 gal)	227L (60 gal)	227L (60 gal)

The presence of flammable liquids in glass containers presents substantial hazards from accidental breakage. Many suppliers furnish glass containers with shatter-resistant coatings. These shatter-resistant glass containers offer significant protection from accidental breakage and are recommended for use when hazardous chemicals must be kept in glass rather than plastic or metal containers. Flammable and combustible materials should be kept as far away from oxidizers as possible. Organic acids, which are combustible, generally should not be stored with mineral acids, which are oxidizers.

5.6.2 Oxidizers

Oxidizers may not be stored in the same container with combustible or flammable liquids. Gaseous oxidizing materials are highly reactive, and can react vigorously with finely divided metals, organic liquids, and other materials that are readily oxidizable; and therefore must be stored in a ventilated flame resistant cabinet. Spilled oxidizers should be placed in a clean, separate container and disposed of in a proper manner. Oxidizer materials should not be placed in the trash. Spilled materials should never be returned to the original container.

5.6.3 Health Hazards

Chemicals that are considered to be health hazards include those that are highly toxic and carcinogenic substances. Storage areas should exhibit a warning sign and have limited access.

5.6.4 Compressed gases

Cylinders of compressed gas should be securely strapped or chained to a wall or bench top. When a cylinder is not in use, it must be capped. Cylinders should always be stored in a secure, upright position.

5.6.5 Corrosives

Corrosives should never be stored with combustible or flammable materials. They should be stored in storage cabinets or in polyethylene trays or containers large enough to contain the contents of the bottle. Care must be exercised to prevent mutually reactive substances from contacting one another. For example, sulfuric acid should never be stored in the same tray or cabinet as sodium hydroxide.

5.6.6 Water-sensitive and air-sensitive chemicals

Water-sensitive chemicals should be stored away from water sources. Air-sensitive chemicals should be stored under inert gas whenever possible. Containers should be waterproof and/or sealed against air exchange, and inspected frequently.

5.6.7 Unstable chemicals or chemicals with a short shelf life

Whenever possible, unstable chemicals or those with a short shelf life should be purchased with inhibitors present. Consumption of the chemical should occur before the inhibitor is exhausted. These chemicals should be protected from heat, high temperature, rapid temperature changes, mechanical shock and light.

5.6.8 Incompatible chemicals

Chemicals that are incompatible should not be stored together. It is impossible to list all of the chemical incompatibilities that can be potentially encountered in the storage area. When in doubt, lab workers should consult the PI or LHO for proper storage instructions. An SDS and references such as NFPA 49, Hazardous Chemicals Data; and NFPA 491M, Manual of Hazardous Chemical Reactions, can provide useful information concerning potential storage problems.

5.6.9 Labels

Make sure all labels are legible. Labels for all secondary containers must contain the chemical name and hazards present. Date all peroxidizable and other chemicals which may become unstable over time. Test and/or dispose of them within a year of receiving.

5.6.10 Containers

Make sure all containers are in good condition. If deteriorated containers are found, transfer the chemical to a good container and dispose of the old container. Make sure the container is appropriate for the chemical being stored. Examples are: hydrofluoric acid must not be stored in glass containers and some oxidizers should not be stored in plastic containers.

6. LABORATORY FUME HOODS

The chemical fume hood is one of the most important pieces of safety equipment in the A&M-Texarkana laboratory. The fume hood is intended for use during all procedures which pose a significant inhalation hazard. A properly maintained and working fume hood provides a continuous wall of air flowing though the face of the hood.

6.1 Fume Hood Air Flow

Air flow patterns in labs can be affected by many factors, such as traffic patterns, room make-up air, doorways, room size, hood location, work practices, objects inside the hood, baffle adjustments and sash openings. Ideally, there should never be any turbulence at the hood face which could spill contaminated air into the room. All areas of the open hood face should have a velocity sufficient to draw room air and not spill contaminated air from the hood.

6.2 Fume Hood Classification Guidelines

Fume hood velocities for all labs on the A&M-Texarkana campus will be evaluated by certified personnel on an annual basis. The face velocity of all hoods shall fall between 80 and 120 feet per minute (FPM) for normal chemical use. If the face velocity is between 70-79 or 121-150, the hood

should be marked for restricted use, indicating it should not be used for protection from highly toxic substances. If the hood falls into any other range, it shall not be used, and it will be marked indicating it is shut down for repairs.

6.3 Fume Hood Work Practices

6.3.1 All work involving hazardous chemicals that pose a vapor hazard must be performed inside a ventilation hood.

6.3.2 Before any work involving hazardous chemicals is performed, turn the hood fan on and make sure it is working.

6.3.3 Check the inspection sticker to make sure the hood has been inspected within the last year.

6.3.4 Fume hoods should be used with the sash positioned at 18 inches or less when possible for optimal performance.

6.3.5 Keep all equipment at least 6 inches inside the face of the hood to prevent disruptive airflow patterns.

6.3.6 Maintain an air space under large equipment by placing on blocks to allow air currents to freely pass under the equipment. This minimizes "dead space" at the hood face and thereby improves overall hood performance.

6.3.7 Do not use the fume hood as a storage cabinet. Excessive storage can obstruct airflow and cause areas of low air velocity at the face opening.

6.3.8 Do not put your face or head inside the hood.

6.3.9 Do not use perchloric acid in the A&M-Texarkana fume hood, as it is not designed for the use of this chemical.

6.3.10 Minimize sources of cross drafts (open windows, doors, fans, etc.) which may pull contaminated air from the hood.

6.3.11 Ensure all fume hood users are aware of safety procedures in case of an emergency.

6.4 Fume Hood Inspections

Fume hoods shall be inspected on an annual basis by qualified persons and shall be certified in writing. The LHO will maintain a copy of the fume hood certification and a label will be placed on the hood indicating the date inspected, the person/company performing the inspection and that the hood is in proper working order. In the event a fume hood fails an inspection, a warning sign shall be posted indicating the fume hood is out of service for repair and the hood shall not be operated for any reason until properly repaired.

Any observed decline or failure of operation warrants an immediate shut-down of the hood and the LHO shall be notified to initiate repairs and post warning signs that the hood is inoperable.

7. ELECTRICALLY POWERED LABORATORY APPARATUS

The utilization of electrically powered equipment can pose hazards in the laboratory when not used properly. Problems that are encountered when using any lab equipment should be reported to the laboratory supervisor immediately.

7.1 Electrical Concerns

The typical laboratory requires a large quantity of electrical power. This increases the likelihood of electrically-related problems and hazards. The following recommendations are basic to a sound electrical safety program in the laboratory.

7.1.1 All electrical equipment should be properly grounded.

7.1.2 All electrical equipment shall be U.L. listed and/or F.M. approved.

7.1.3 Sufficient room for work must be present in the area of breaker boxes. All circuit breakers and fuses shall be labeled to indicate whether they are in the "on" or "off" position, and what appliance or room area is served.

7.1.4 All electrical equipment shall be routinely checked to ensure it is in good working order.

7.1.5 All power cords will be checked for cuts or fraying before each use.

7.1.6 Extension cords shall not be used as a substitute for permanent wiring.

7.1.7 Electrical cords shall not be suspended over doors or passageways. Cords should not be routed over metal objects such as emergency showers, overhead pipes or metal racks. Do not place cords under carpets, rugs or heavy objects. Do not place cords across pathways where they will become worn from repeated abuse.

7.1.8 Multi-outlet plugs shall not be used unless they have a built-in circuit breaker. This can cause overloading on electrical wiring, which will cause damage and possible overheating.

7.2 Autoclaves

The use of an autoclave is a very effective way to decontaminate infectious waste. Autoclaves work by killing microbes with superheated steam. Although they are very effective sterilizers, accidents and injuries can result from improper use. To ensure safe operation of the autoclave, only individuals approved by the LHO should operate the autoclave. The Autoclave Use Log and the Biological Indicator Test Log (if applicable) must be filled out, and the following procedures must be utilized:

7.2.1 Do not put sharp or pointed contaminated objects into an autoclave bag. Place them in an appropriate rigid sharps container for pick up, do not autoclave.

7.2.2 If using red biohazard bags when autoclaving hazardous waste, then mark the bag with heat sensitive autoclave tape. Place sterilized material and biohazard bag in a black trash bag before disposing as regular trash.

7.2.3 Always use caution when handling an infectious waste autoclave bag in case sharp objects were inadvertently placed in the bag. Never lift a bag from the bottom to load it into the chamber, lift from the top of the bag.

7.2.4 Never overfill an autoclave as an over-packed autoclave chamber does not allow efficient steam distribution.

7.2.5 Conduct autoclave sterility testing on a regular basis using appropriate biological indicators to monitor efficiency. Use indicator tape with each load to verify it has been autoclaved.

7.2.6 Do not mix contaminated and clean items together during the same autoclave cycle. Clean items generally require shorter decontamination times (15-20 minutes) while a bag of infectious waste (24" X 36") typically requires 45 minutes to an hour to be effectively decontaminated throughout.

7.2.7 All lab workers shall wear personal protective equipment, including heat resistant gloves, safety glasses and a lab coat when operating an autoclave. Caution should be used when opening the autoclave door, allowing superheated steam to exit before removing the contents.

7.2.8 Always be on the alert when handling pressurized containers as superheated liquids may spurt from closed containers. Never seal a liquid container with a cork or stopper as this could cause an explosion inside the autoclave.

7.2.9 Use a secondary tray to catch any potential leakage from an autoclave bag rather than allowing it to leak onto the floor of the autoclave chamber.

7.2.10 If there is a spill inside the autoclave chamber, allow the unit to cool before attempting to clean up the spill. If glass breaks in the autoclave, use tongs, forceps, or other mechanical means to recover fragments. Do not use bare or gloved hands to pick up broken glassware.

7.2.11 Do not leave an autoclave operating unattended for a long period. Always be sure someone is in the vicinity while an autoclave is cycling in case there is a problem.

7.2.12 All autoclaves should be placed under a preventive maintenance contract to ensure they are operating properly.

7.3 Centrifuges

All centrifuge operators shall be instructed on proper operating procedures, which would include balancing loads, selection of proper rotor, head, cups, tubes, and use of accessory equipment. (Consult the centrifuge operating manual.) Additionally, the following guidelines should be followed when dealing with centrifuges:

7.3.1 The centrifuge operator is responsible for the condition of the machine at the end of each procedure.
7.3.2 Operating procedures for each centrifuge must be established by the PI in accordance with the procedural outlines in the operating manual. Guidelines for centrifugation of infectious agents, chemical hazards, and/or radioactive materials must be included in the procedures.
7.3.3 Plastic centrifuge tubes should be used whenever possible to minimize breakage.
7.3.4 Nitrocellulose tubes should only be used when clear, without discoloration, and flexible. It is advisable to purchase small lots several times a year rather than one large lot. Storage at 4°C extends shelf life. Nitrocellulose tubes must not be used in angle-head centrifuges.
7.3.5 All centrifuge tubes must be inspected before each use. Broken, cracked, or damaged tubes should be disposed of properly.
7.3.6 Refer to the centrifuge operating manual for selection of appropriate tubes, carrier cups, and rotors. Capped centrifuge tubes should be used whenever possible.

7.4 Refrigerators

There should not be any potential sources of electrical sparks on the inside of a laboratory refrigerator where chemicals are to be stored. Three types of chemical storage refrigerator/freezers exist: explosion-proof, explosion-resistant, and modified domestic models. If the unit will be used to store flammable or combustible materials, the refrigerator/freezer should be explosion-resistant and labeled to indicate it is suitable for storing flammable materials.

The explosion-resistant refrigerator/freezer has a spark-proof, corrosion-resistant interior. The electrical components are encased, and the door gaskets are non-sparking. The explosion-proof refrigerator is engineered for spark-proof operation externally. This type of refrigerator is hard-wired at installation to meet local electrical codes for maximum safety in hazardous areas, such as a chemical storage room.

All refrigerators in laboratories, regardless of the type, should never be used to store food and must have labels on the door indicating this.

7.5 Drying Ovens

Drying ovens are commonly used to remove water or other solvents from samples and to dry laboratory glassware. Since these ovens do not have a provision for preventing the discharge of volatilized substances into the air, organic compounds should not be dried in these units. Conventional oven units should not be used to dry any chemical that is moderately volatile and might pose a health hazard of acute or chronic toxicity. Glassware rinsed in organic solvent should not be dried in an oven.

7.6 Lasers

Currently, A&M-Texarkana is not equipped for the use of lasers. Lasers shall not be used until approval is given by the Chemical and Radiation Safety Committee (CARSAC), LHO, and PI. This paragraph will be updated in a later revision according to recommendations from CARSAC.

8. SPECIAL PROVISIONS FOR PARTICULARLY HAZARDOUS SUBSTANCES

In addition to general safety guidelines, special precautions are needed when handling select carcinogens, reproductive toxins, and substances that have a high degree of acute toxicity.

8.1 The LHO shall ensure that the below listed precautions are taken in order to minimize risk of exposure to these substances.

8.1.1 Quantities of these substances used and stored in the laboratory should be minimized, as should their concentrations in solutions or mixtures.

8.1.2 Work with genotoxins, reproductive toxins and acutely toxic chemicals should be performed within a functioning hood, biological safety cabinet, sealed system, or other system designed to minimize exposure to these substances. (The exhaust air from the ventilation system may require scrubbing before being released into the atmosphere). In all cases, work with these chemicals shall be done in such a manner that the OSHA permissible exposure limits (PEL) or similar standards are not exceeded.

8.1.3 Compressed gas cylinders which contain acutely toxic chemicals, such as arsine and nitrogen dioxide, should be kept in ventilated gas cabinets. The ventilation efficiency of the designated ventilation hood or gas cabinet and the operational effectiveness of mechanical and electrical equipment used to contain or manipulate these special substances should be evaluated periodically by the LHO. The interval of evaluating systems may vary from weekly to semi-annually depending on the frequency of usage, quantities employed, and the level of the hazard.

8.1.4 A&M-Texarkana laboratories utilizing these substances must designate an area for this purpose and must sign or mark this area with an appropriate hazard warning. The designated area may be the entire laboratory, an area of the lab or a device such as a ventilation hood or glove box. The designated area must be marked with a DANGER, AUTHORIZED PERSONNEL ONLY, or comparable warning sign listing the specific agent.

8.1.5 All laboratory staff who work in an A&M-Texarkana lab which has an area designated for use with select carcinogens, reproductive toxins and acutely toxic chemicals must be trained regarding the serious harmful effects of these substances as well as signs and symptoms regarding exposure to these substances, whether or not they actually work with the substances themselves.

8.1.6 A&M-Texarkana lab workers working with these substances must have access to the appropriate personal protective equipment and clothing and must be trained on how to properly utilize the safety equipment.

8.1.7 Detection equipment may be required if chemicals (especially poisonous gases) with a high degree of acute toxicity are utilized.

8.1.8 All waste contaminated with these substances should be collected and disposed of in a timely manner as outlined in the A&M-Texarkana Hazardous Waste Program.

8.1.9 The designated work area shall be thoroughly decontaminated and cleaned at regular intervals.

8.1.10 Special precautions to avoid release and exposure to highly toxic chemicals, reproductive toxins, and genotoxins must be utilized. For instance, volatile substances should be kept cool and contained. Gas bottles should have properly functioning valves, check valves, and regulators. Containers that can withstand pressure buildup and have appropriate piping and dispersive solids, should be kept closed and used in places with minimum air currents. Appropriate contact materials should be used to avoid static charging.

8.1.11 Emergency response planning for releases or spills shall be prepared by the LHO and included in the training of laboratory workers and others which may be affected in the building.

9. CHEMICAL DISPOSAL

Hazardous chemicals used in the A&M-Texarkana laboratory will be disposed of in a safe, approved manner consistent with all applicable laws and the A&M-Texarkana Hazardous Waste Management Program. Laboratory staff should use the smallest quantity of hazardous substance practical to generate the least amount of hazardous waste. This shall include reviewing experimental protocols with the goal of substituting non-hazardous or less hazardous reagents, using micro-scale procedures, and using materials that can be easily neutralized or detoxified.

10. BIOLOGICAL WASTE

"BIOLOGICAL WASTE" means discarded biological material from teaching, clinical, and research laboratories and operations. This does not include household or office trash, waste from Food Services, Central Plant, or bedding and litter from noninfectious animals. **"BIOHAZARDOUS WASTE"** means any solid or liquid biological waste that is hazardous because of its physical and/or biological nature. All waste that contains infectious material or which, because of its biological nature, may be harmful to humans, animals, plants, or the environment is biohazardous waste. This includes: waste from infectious animals, bulk human blood or blood products, microbiological waste, pathological waste, sharps, and hazardous products of recombinant DNA biotechnology and genetic manipulation.

Treatment of all laboratory biological waste prior to disposal is good laboratory practice, and is highly recommended, but biohazardous waste must be treated prior to disposal. Acceptable treatment methods include thermal or chemical disinfection, encapsulation (solidification), or incineration.

The key requirements for disposal of biohazardous waste are that it must be (1) segregated from other waste; (2) securely packaged; (3) specifically labeled to indicate the method of treatment; (4) transported to the point of treatment or disposal by appropriately trained personnel; (5) treated to eliminate the biological hazard; and (6) documented by maintenance of appropriate records.

Biohazardous waste that is mixed with hazardous chemical waste, radioactive waste, or both must be treated to eliminate the biohazard prior to disposal. After treatment, the waste must be managed as hazardous chemical waste or as radioactive waste through CARSAC and EH&S.

Appendix D summarizes requirements for treatment and disposal of biohazardous waste at TAMUT. Appendix E provides a model form for maintaining the record of treatment of biohazardous waste. Questions or requests for any variance from these procedures should be directed to the EH&S Office (334-6618).

11. SEGREGATION

11.1 Any waste that could produce laceration or puncture injuries must be disposed of as “sharps.” Sharps must be segregated from other waste. Metal sharps and broken glass may be commingled with each other, but not with non-sharp waste.

11.2 Waste that is to be incinerated should not be commingled with glass or plastics.

11.3 Biological waste must not be commingled with chemical waste or other laboratory trash.

11.4 Biohazardous waste should be segregated from other biological waste.

12. CONTAINERS

Containers must: be appropriate for the contents; not leak; be properly labeled; and maintain their integrity if chemical or thermal treatment is used. Containers of biohazardous material should be kept closed.

12.1 METAL SHARPS -- Use a rigid, puncture-resistant container (heavy-walled plastic is recommended) suitable for encapsulation and disposal. Container and encapsulated contents must withstand an applied pressure of 40 psi without rupture.

12.2 PASTEUR PIPETS and BROKEN GLASSWARE – Use a rigid, puncture-resistant container (e.g., plastic, heavy cardboard or metal) that can be sealed.

12.3 SOLID BIOHAZARDOUS WASTE – Use heavy-duty plastic "BIOHAZARD BAGS" (autoclave bags) or containers for solid biohazardous waste.

12.4 NON-HAZARDOUS SOLID BIOLOGICAL WASTE – Use heavy-duty plastic bags or other appropriate containers without a Biohazard Symbol. Red or orange biohazard bags or containers should not be used for non-hazardous material.

12.5 LIQUIDS – Use leak-proof containers able to withstand thermal or chemical treatment.

13. STORAGE

Biological waste may be held temporarily under refrigeration, prior to disposal, in a safe manner that does not create aesthetic (visual or odor) problems. Biohazardous waste should be treated and disposed of promptly and not allowed to accumulate. Containers holding biohazardous material must be clearly labeled, including the Biohazard Symbol. Temporary holding areas for biohazardous waste must be clean and orderly with no access to unauthorized persons (warning signs should be posted).

14. LABELING BIOHAZARDOUS WASTE CONTAINERS

14.1 Each container of untreated biohazardous waste must be clearly identified as such and must be labeled with the Biohazard Symbol.

14.2 Each container of treated biohazardous waste to be placed in a TAMU trash dumpster must be labeled to indicate the method of treatment and to cover biohazard markings.

14.3 Label autoclave bags with commercially available autoclave tape that produces the word AUTOCLAVED upon adequate thermal treatment. Apply this tape across the Biohazard Symbol on the bag before autoclaving.

14.4 All containers of encapsulated sharps must be labeled as ENCAPSULATED SHARPS.

NOTE: It is not a requirement to label containers of non-hazardous biological waste, but it is recommended to label such containers as "NON-HAZARDOUS BIOLOGICAL WASTE".

15. HANDLING AND TRANSPORT

15.1 Only properly trained technical personnel can handle or transport untreated biohazardous waste.

15.2 Treated waste must also be transported by properly trained technical personnel (not custodial).

15.3 Avoid transporting untreated biohazardous materials or foul or visually offensive material through non-lab or populated areas.

15.4 Trash/laundry chutes, compactors, grinders cannot be used to transfer or process untreated biohazardous waste.

16. TREATMENT AND DISPOSAL METHODS (summarized in Appendix D)

NOTE: Waste should be treated as near the point of origination as possible.

16.1 ANIMAL CARCASSES AND BODY PARTS must be incinerated or sent to a commercial rendering plant for disposal. The landfill will not accept carcasses or recognizable body parts. Carcasses of animals that die in the field may not be buried on site.

16.2 SOLID ANIMAL WASTE (bedding, manure, etc.):
- 16.2.1 BIOHAZARDOUS ANIMAL WASTE:
  - 16.2.1.1 Incinerate; OR
  - 16.2.1.2 Disinfect by thermal or chemical treatment; place in a TAMUT trash dumpster.
- 16.2.2 NON-HAZARDOUS ANIMAL WASTE: Use as compost or fertilizer whenever practical.

16.3 METAL SHARPS: Discarded metal sharps **MUST** be contained, encapsulated and disposed of in a manner that prevents injury to laboratory, custodial and landfill workers. Needles, blades, etc., are considered BIOHAZARDOUS even if they are sterile, capped and in the original container.

Never place sharps in a trash container or plastic bag that might be handled by custodial staff.

- 16.3.1 Place containers of encapsulated sharps in a TAMU trash dumpster.
- 16.3.2 Gas chromatography needles should be thoroughly rinsed to remove hazardous chemicals, then disposed with non-contaminated broken glassware.
- 16.3.3 Do not attempt to recap, bend, break or cut discarded needles.

16.4 PASTEUR PIPETS and BROKEN GLASSWARE:

16.4.1 CONTAMINATED WITH BIOHAZARDOUS MATERIAL:

16.4.1.1 Disinfect by thermal or chemical treatment then place in a TAMUT trash dumpster; OR

16.4.1.2 Encapsulate and place in a TAMUT trash dumpster. **NOTE: Encapsulation is required if metal sharps are commingled with glass sharps.**

16.4.2 NOT CONTAMINATED: Place in a TAMUT trash dumpster.

16.4.3 **DO NOT INCINERATE GLASSWARE.**

16.5 PLASTIC WASTE:

16.5.1 CONTAMINATED WITH BIOHAZARDOUS MATERIAL: Disinfect by thermal or chemical treatment; place in a TAMUT trash dumpster.

16.5.2 NOT CONTAMINATED: Place in a TAMUT trash dumpster.

16.5.3 **DO NOT INCINERATE PLASTICS.**

16.6 MICROBIOLOGICAL WASTE:

16.6.1 Solid -- Disinfect by thermal or chemical treatment; place in a TAMUT trash dumpster.

16.6.2 Liquid -- Disinfect by thermal or chemical treatment; discharge into the sewer system.

16.7 HUMAN PATHOLOGICAL WASTE:

16.7.1 Human cadavers, recognizable body parts: dispose by cremation or interment.

16.7.2 Other solids – incinerate, or disinfect for disposal in TAMUT trash dumpster.

16.7.3 Body fluids – disinfect by thermal or chemical treatment; discharge into the sewer system.

16.8 GENETIC MATERIAL: Disposal of materials containing recombinant DNA or genetically altered organisms must be consistent with applicable NIH Guidelines, in addition to complying with the requirements contained in this document.

16.9 NON-HAZARDOUS BIOLOGICAL WASTE:

16.9.1 It is good laboratory practice to autoclave or chemically treat all microbial products prior to disposal, even if the material is not hazardous.

16.9.2 Solid – Place in a TAMUT trash dumpster.

16.9.3 Liquid – Discharge into the sewer system.

16.10 RADIOACTIVE WASTE: Biological waste that contains radioactive material must be disposed according to the procedures of CARSAC and EH&S.

16.11. CHEMICAL WASTE: Biohazardous waste which also contains hazardous chemicals must be managed as hazardous chemical according to the TAMUT Hazardous Waste Program.

17. EMERGENCY PROCEDURES

All laboratory personnel need to know what to do in the event of a chemical spill or other emergency that may occur in A&M-Texarkana laboratories. While most spills can be safely cleaned up by those who caused the spill, some spills should only be cleaned up by specifically trained emergency response personnel. Most spills can be avoided if proper spill prevention guidelines are followed. The LHO, PI, and the EH&S Office shall be notified whenever there is a spill of any type. An investigation will be conducted in order to find out the cause of the spill and what precautions can be taken to prevent it from happening again.

17.1 Spill Prevention

17.1.1 General precautions

17.1.1.1 Reduce clutter and unnecessary materials in work areas
17.1.1.2 Eliminate tripping hazards
17.1.1.3 Have all of the needed equipment readily available before starting work
17.1.1.4 Storage precautions
17.1.1.5 Use sturdy shelves
17.1.1.6 Store large containers close to the floor
17.1.1.7 Push containers on shelves to the back of the shelf to avoid falling
17.1.1.8 Purchase storage shelves with lips to further reduce the danger of falling
17.1.1.9 Inspect the storage area on a regular basis for leaking or defective containers
17.1.1.10 Use the appropriate storage container
17.1.1.11 Do not store unprotected glass containers on floor

17.1.2 Transportation precautions

17.1.2.1 Use carts when appropriate to transfer chemicals
17.1.2.2 Use safety containers when possible
17.1.2.3 Use bottle carriers for large bottles
17.1.2.4 Use straps to secure containers when appropriate
17.1.2.5 Think about potential hazards before transporting chemicals
17.1.2.6 Consider purchasing plastic coated shatter resistant bottles

17.1.3 Transferring precautions

17.1.3.1 Pay careful attention to the size container being used to avoid overfilling
17.1.3.2 Use pumps or other mechanical devices rather than simply pouring a chemical
17.1.3.3 Provide containment to capture leaks and spills

17.2 Spill Preparation

Before any hazardous chemical is used in the laboratory, the PI of the laboratory has the responsibility to perform a hazard assessment of the procedure to be undertaken. This shall include determining what could go wrong and what to do in the event of a spill or other emergency. When performing this task, the PI should determine what PPE is needed, as well as any other safety equipment and containment/clean-up materials and to have these items on hand. Spill control kits should be available and their locations clearly marked. All staff and students should be aware of the kits, how to use them, and their limitations.

17.2.1 Suggested items for a Spill Kit:

17.2.1.1 Safety goggles/glasses
17.2.1.2 Lab coat
17.2.1.3 Heavy gloves appropriate for the material
17.2.1.4 5-gallon plastic bucket
17.2.1.5 Small bag of absorbent (kitty litter)
17.2.1.6 Acid/Base neutralization materials
17.2.1.6.1 Acid spill – sodium bicarbonate
17.2.1.6.2 Base spill – monosodium phosphate
17.2.1.7 Small broom and dustpan
17.2.1.8 Anti-static scoop

17.3 Emergency Response

Anytime a spill occurs, whether a major spill or relatively minor one, there are certain procedures to follow to ensure the situation is controlled as much as possible. This helps to prevent or minimize further injury or damage to property and the environment. If a small spill is not handled properly, it can turn into a much more serious situation. Large spills can turn into major catastrophes if not handled properly.

17.3.1 Small spills:

- 17.3.1.1 Alert other staff and students in the area of the spill
- 17.3.1.2 Wear protective equipment, including safety goggles, gloves, and lab coat
- 17.3.1.3 Avoid breathing vapor of spilled materials
- 17.3.1.4 Absorb or cover the spill with suitable materials, collect residue, place in container, and dispose of in accordance with the A&M-Texarkana Hazardous Waste Management Program
- 17.3.1.5 Clean spill area with soap and water for final decontamination
- 17.3.1.6 Notify the LHO or PI who shall in turn notify the EH&S Office. Dependent on the hazardous nature of the chemical spilled, the LHO or PI will decide if the situation warrants notifying any other responders

17.3.2 Large spills:

- 17.3.2.1 Attend to injured or contaminated persons and remove them from the area
- 17.3.2.2 Alert people in and around the lab to evacuate
- 17.3.2.3 Call 911 for emergency responders
- 17.3.2.4 Turn off ignition and heat sources
- 17.3.2.5 Close doors to affected areas
- 17.3.2.6 Make sure the incident area is sealed off and have knowledgeable laboratory staff available to consult with emergency responders
- 17.3.2.7 Meet at a designated area away from the incident to ensure all persons are accounted for
- 17.3.2.8 Notify the LHO and PI who shall in turn notify the EH&S Office, University President, V.P. for Academic Affairs, and the Director of Facilities as needed

17.4 Contamination:

- 17.4.1 In case of skin contact, flush the area with large amounts of water for at least 15 minutes and seek medical assistance
- 17.4.2 In case of eye contact, flush eyes for at least 15 minutes with large amounts of water and seek medical assistance
- 17.4.3 Remember to call 911 for all medical emergencies and notify the LHO and PI, who shall in turn notify the EH&S Office

18. TRAINING

All individuals who work in A&M-Texarkana laboratories who may be exposed to hazardous chemicals must be apprised of the hazards of chemicals present in the lab. Laboratory safety training must be provided to all new employees before initial assignment. The A&M-Texarkana Laboratory Hygiene Officer is responsible for ensuring all staff and students are properly trained in the use of hazardous chemicals and equipment in the laboratory.

Laboratory training must include:

18.1 Detection methods and observations that may be used to detect the presence or release of hazardous chemical. Examples of detection methods include visual appearance, odor, and an understanding of chemical monitoring devices.
18.2 Physical and health hazards of the chemical.
18.3 Work practices, personal protective equipment, and emergency procedures to be used to ensure that the employee may protect him/herself from exposure to hazardous chemicals.
18.4 All laboratory workers must also be informed of the location and availability of the following:
  18.4.1 Location of and information on how to read an SDS
  18.4.2 OSHA Lab Standard – 29 CFR Part 1910.1450
  18.4.3 A&M-Texarkana Chemical & Biological Hygiene Program
  18.4.4 Reference material on chemical safety
  18.4.5 Permissible exposure limits (PELs) for OSHA regulated substances
  18.4.6 Signs and symptoms associated with exposure to the hazardous chemicals found in the A&M-Texarkana lab

The training of all staff and students shall be documented as to date, time, instructor's name, and what information was covered. Staff training records shall be maintained by the EH&S Office.

19 MEDICAL EVALUATIONS

Medical consultation and/or examination by a licensed physician who is experienced in diagnosing and treating victims of chemical exposure shall be made available to employees of A&M-Texarkana laboratories under the following circumstances:

19.1 When any individual develops signs or symptoms associated with exposures to the hazardous materials being used.
19.2 When monitoring reveals exposures above the "Action Level" or Permissible Exposure Limit (PEL) established for the chemical.
19.3 An accident such as a spill or equipment failure results in possible exposure to hazardous materials. This would also include any follow-up exams deemed necessary by the licensed physician. All exams and consultations will be provided at no cost to the employee, without loss of pay, and at a reasonable time and place. A&M-Texarkana will provide the physician with:
  19.3.1 Identity of the hazardous chemical the employee was exposed to, if known
  19.3.2 Description of the conditions under which the exposure occurred
  19.3.3 Description of the signs and symptoms of exposure that the individual is experiencing

Appendix A – Chemical Incompatibility List

Chemical	Incompatible With
Acetic acid	Chromic acid, nitric acid, perchloric acid, peroxides, permanganates
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Acetone	Concentrated nitric acid and sulfuric acid mixtures
Alkali and alkaline earth metals	Water, carbon tetrachloride or other chlorinated hydrocarbons i.e., powdered aluminum or magnesium, carbon dioxide, halogens, calcium, lithium, sodium, potassium
Ammonia (anhydrous)	Mercury (in manometers, for example), chlorine, calcium hypochlorite, iodine, bromine, anhydrous HF
Ammonium nitrate	Acids, powdered metals, flammable liquids, chlorates, nitrites, sulfur, finely divided organic or combustibles
Aniline	Nitric acid, hydrogen peroxide
Arsenical materials	Any reducing agent
Azides	Acids
Bromine	See Chlorine
Calcium oxide	Water
Carbon (activated)	Calcium hypochlorite, all oxidizing agents
Carbon tetrachloride	Sodium
Chlorates	Ammonium salts, acids, powdered metals, sulfur, finely divided organic or combustible materials
Chromic acid and chromium trioxide	Acetic acid, naphthalene, camphor, glycerol, alcohol, flammable liquids in general
Chlorine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, benzene, finely divided metals, turpentine
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Copper	Acetylene, hydrogen peroxide

Chemical	Incompatible With
Cumene hydroperoxide	Acids (organic or inorganic)
Cyanides	Acids
Decaborane	Carbon tetrachloride and some other halogenated hydrocarbons
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Fluorine	Everything
Hydrocarbons (such as butane, propane)	Fluorine, chlorine, bromine, chromic acid, sodium peroxide
Hydrocyanic acid	Nitric acid, alkali
Hydrofluoric acid (anhydrous)	Ammonia (aqueous or anhydrous)
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, alcohols, acetone, organic materials, aniline, nitromethane.
Hydrogen sulfide	Fuming nitric acid, oxidizing gases
Hypochlorites	Acids, activated carbon
Iodine	Acetylene, ammonia (aqueous or anhydrous), hydrogen
Mercury	Acetylene, fulminic acid, ammonia
Nitrates	Sulfuric acid
Nitric acid (concentrated)	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, copper, brass, any heavy metals
Nitrites	Acids
Nitroparaffins	Inorganic bases, amines
Oxalic acid	Silver, mercury
Oxygen	Oils, grease, hydrogen, flammable liquids, solids, or gases
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils
Peroxides, organic	Acids (organic or mineral), avoid friction, store cold

Chemical	Incompatible With
Phosphorous (white)	Air, oxygen, alkalis, reducing agents
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate	Sulfuric and other acids
Potassium perchlorate (also chlorates)	Sulfuric and other acids
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, sulfuric acid
Selenides	Reducing agents
Silver	Acetylene, oxalic acid, tartaric acid, ammonium compounds, fulminic acid
Sodium	Carbon tetrachloride, carbon dioxide, water
Sodium nitrite	Ammonium nitrate and other ammonium salts
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerine, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate (similar compounds of light metals such as sodium, lithium)
Tellurides	Reducing agents

Appendix B – OSHA Permissible Exposure Limit

A Permissible Exposure Limit (PEL) is a Time Weighted Average (TWA) concentration that must not be exceeded during any 8-hour work shift of a 40-hour work week. A Short Term Exposure Limit (STEL) is measured over a 15-minute period. A "ceiling" concentration must not be exceeded during any part of the workday; if instantaneous monitoring is not feasible, the ceiling must be assessed as a 15-minute TWA exposure. The "skin" designation indicates the potential for dermal absorption; skin exposure should be prevented as necessary through the use of good work practices and gloves, goggles, and other appropriate equipment.

Chemical Name	PEL (ppm)	PEL (mg/m3)	Comment
Acetaldehyde	200	360	
Acetic Acid	10	25	
Acetone	1000	2400	
Acetonitrile	40	70	
STEL	60	105	
Acrolein	0.1	0.25	
STEL	0.1	0.69	
Acrylamide		0.3	skin
Acrylonitire	2		
Ammonia (anhydrous)	35	27	
Ammonium hydroxide	35	27	
Aniline	5	19	skin
Arsine	0.05	0.2	
Benzene	1	3.2	
Boron trifluoride	1	3	ceiling
Bromine	0.1		
Carbon disulfide	4	12	
STEL	12	36	skin
Carbon monoxide	50	55	
Carbon tetrachloride	2	13	
Chlorine	1	3	
Chloroform	50	240	ceiling
Chromium trioxide		0.1	ceiling
Diazomethane	0.2	0.4	
Diborane	0.1		
Dichloromethane	500		
Diethyl ether	400		
Dimethyl sulfate	1	5	skin
Dimethylformamide	10	30	skin
Dioxane	100	360	skin
Ethanol	1000	1900	
Ethyl acetate	400	1400	

Ethylene dibromide	20	150	
Ethylene oxide	1	2	
Fluorides (inorganic)		2.5	
Fluorine	0.1	0.2	
Formaldehyde	1	1.5	
STEL	2	2.5	
Hexane	500	1800	
Hydrazine	1	1.3	skin
Hydrobromic acid	3	10	
Hydrochloric acid	5	7	ceiling
Hydrogen cyanide	10	11	skin
Hydrogen fluoride	3		
Hydrofluoric acid	3		
Hydrogen peroxide	1	1.4	
Hydrogen sulfide	20	28	ceiling
Iodine	0.1	1	ceiling
Lead		0.05	
Mercury		0.1	ceiling
Methanol	200	260	
Methyl ethyl ketone	200	590	
Methyl iodide	5	28	skin
Nickel carbonyl	0.001	0.007	
Nitric acid	2/5		
Nitrogen dioxide			5/9-celing
Osmium tetroxide	0.0002	0.0002	
Ozone	0.1	0.2	
Phenol	5	19	skin
Phosgene	0.1	0.4	
Phosphorus		0.1	
Potassium hydroxide		2	
Pyridine	5	15	
Silver		0.01	
Sodium hydroxide		2	
Sulfur dioxide	5	13	
Sulfuric acid		1	
Tetrahydrofuran	200	590	
Toluene	200	750	
STEL	150	560	
Toluene diisocyanate	0.02	0.14	ceiling
Trimethyltin chloride		0.1	mg of tin

Appendix C – Peroxide Forming Chemicals

The following classes of chemicals tend to form peroxides upon aging.

Class I - Unsaturated materials, especially those of low molecular weight, may polymerize violently and hazardously due to peroxide initiation.

acrylic acid
acrylonitrile
1,3-butadiene
2-chloro-1,3-butadiene (chloroprene)
Chlorotrifluoroethylene
1,1-dichloroethene
methyl methacrylate
styrene
tetrafluoroethylene
vinyl acetate
vinyl acetylene
vinyl chloride
vinyl pyridine
vinylidene chloride

Class II - The following chemicals are a peroxide hazard upon concentration (distillation/evaporation). A test for peroxides should be performed if concentration is intended or suspected.

acetal
cyclohexane
cyclooctene
cyclopentene
diacetylene
dicyclopentadiene
diethylene glycol dimethyl ether (diglyme)
diethyl ether
dioxane (p-dioxane)
ethylene glycol dimethyl ether (glyme)
furan
isopropyl benzene
methylacetylene
methylcyclopentane
methylisobutyl ketone
tetrahydrofuran
tetrahydronaphthalene
vinyl ethers

Class III - Peroxides derived from the following compounds may explode without concentration.

divinyl ether
divinyl acetylene
diisopropyl ether
1,1-dichloroethane
potassium metal
potassium amide
sodium amide

Appendix D – Biohazardous Waste Treatment Chart

TREATMENT AND DISPOSAL OF BIOHAZARDOUS WASTE AT TEXAS A&M UNIVERSITY-TEXARKANA

TYPE OF WASTE		CONTAINER	TREATMENT METHOD	DISPOSAL METHOD
ANIMAL WASTE				
a.	Carcasses	B	D	N
		B	-	O
b.	Tissue and Body Parts	B	D	N
		B	-	O
c.	Bulk blood and blood products	B	D	N
		B	E or G	J
d.	Animal bedding	A	D	N
		A	E or G	I
MICROBIOLOGICAL WASTE				
a.	Solid	A	D[1]	N
		A	E, F, or G	I
b.	Liquid	B	D	N
		B	E or G	J
PATHOLOGICAL WASTE				
a.	Materials removed during surgery, labor and delivery, autopsy or biopsy including body parts, tissues and organs	B	D	N
		B	E or G	I
b.	Anatomical remains	B	G	K
c.	Bulk blood and blood products	B	D	N
		B	E or G	J
SHARPS				
a.	Metal sharps including hypodermic needles, syringes with needles, scalpel blades, razor blades	C	H	M
b.	Pasteur pipets and broken glass	C	E, F, or G	L
		C	H	M

CONTAINER REQUIREMENTS

A. Heavy duty plastic bag or other appropriate container, such as BIOHAZARD BAGS.

B. Heavy duty leak proof container.

C. Puncture-resistant container.

TREATMENT METHODS

D. Incinerate.

E. Steam autoclave [120°C; 15 psi; 30 min. (minimum)]

F. Dry heat [160°C; 2 hr. (minimum)]

G. Chemical disinfection - 10% hypochlorite or EPA-approved chemical disinfectant or sterilant used according to manufacturer's direction.

H. Encapsulate in a solid matrix [e.g., plaster of Paris or a commerical encapsulant (Isolyser)]

DISPOSAL METHODS

I. Deposit treated waste in a TAMUT trash dumpster

J. Discharge disinfected liquid into the sewer system (NOTE: Excess proteinaceous material can clump and cause drain clogging. Grinding treated waste may be necessary. Do not grind untreated biohazardous material.)

K. Interment or cremation

L. Place in a puncture-resistant container and deposit in a TAMUT trash dumpster

M. Place encapsulated sharps in a TAMUT dumpster

N. Residual incinerator ash is disposed at the New Boston Landfill.

O. Send to commercial rendering plant.

LABELING REQUIREMENTS

Containers of biohazardous materials must be clearly identified and marked with the BIOHAZARD symbol. Containers of treated biohazardous waste must be labeled to indicate the method of treatment and to cover the Biohazard Symbol. Waste that is not biohazardous prior to treatment should not be placed in a "BIOHAZARD" container.

---

[1] **DO NOT INCINERATE GLASS OR PLASTIC LABWARE.**

Appendix E – Autoclave Use Authorization

Autoclave Use Authorization

DATE _____

I have confirmed a basic knowledge of autoclave safety and hereby approve _____ to use the autoclave on the Texas A&M University-Texarkana campus.

_____

LABORATORY HYGIENE OFFICER

Appendix F – Autoclave Waste Treatment Log

Autoclave Waste Treatment Log

Building:		Room Number:	
Department:		Autoclave Number:	
Autoclave Manufacturer:		Start Date:	

Date	Laboratory/ Professor	Length (min.)	Pressure (psig)	Temperature (°C)	Program	Name	Initials	Steam Chemical Integrator Test Accept / Reject	

Minimum Parameters for Waste Treatment (Method/Conditions): Pressure ≥ 15 psig; Temperature ≥ 121°C (250°F); Length of Time ≥ 30 minutes

Appendix G – Biological Indicator Test Results Log

Biological Indicator Test Results Log

Autoclave Make: Model: Manufacturer:

Biological Indicator: Type: Building/Room:

Date of Autoclaving & Incubation	Operator	Cycle Selected & Temperature (°C)	Cycle Time	Number of Test Ampoules	Biological Indicator Expire Date & Lot #	Positive Control (non-sterilized self-contained biological indicator) shows growth (+)	Test Ampoule(s) Pass (P) Fail (P)

Appendix H – Biohazardous Waste Treatment Log

BIOHAZARDOUS WASTE TREATMENT LOG

DEPARTMENT: _____

BUILDING: _____ LAB: _____

SUPERVISOR: _____ PHONE NUMBER: _____

DATE	QUANTITY OF WASTE TREATED	DESCRIPTION OF WASTE	TREATMENT METHOD AND PARAMETERS	PRINTED NAME & INITIALS OF PERSON PERFORMING THE TREATMENT	

Appendix I – Acutely Hazardous Waste

1-Acetyl-2-thiourea
Acrolein
Aldicarb
Aldrin
Allyl alcohol
Aluminum phosphide
5-(Aminomethyl)-3-isoxazolol
4-Aminopyridine
Ammonium picrate
Ammonium vanadate
Arsenic acid
Arsenous oxide
Arsenic oxide
Aziridine
Barium cyanide
Benzyl chloride
Beryllium
Bis(chloromethyl)ether
1-Bromo-2-propanone
Brucine
Calcium cyanide
Carbon disulfide
Chloroacetaldehyde
p-Chloroaniline
(2-Chlorophenyl)thiourea
3-Chloropropionitrile
Cuprous cyanide
Cupric cyanide
Cyanides (water-soluble salts)
Cyanogen
Cyanogen chloride
2-Cyclohexyl-4,6-dinitrophenol
Dichlorophenylarsine
Dieldrin
Diethylarsine
Diethyl-*p*-nitrophenyl phosphate
O,O-Diethyl O-pyrazinyl phosphorothioate
Diisopropylfluorophosphate
Dimethonate
α,α -Dimethylphenethylamine
4,6-Dinitro-*o*-cresol (and salts)
2,4-Dinitrophenol
Disulfoton
Dithiobiuret
Endosulfan
Endothall
Endrin (and metabolites)
Epinephrine
Ethanimidothioic acid, *N*-[[(methylamino)carbonyl]oxy]-, methyl ester
Famphur
Fluorine
Fluoroacetamide
Heptachlor
Hydrogen cyanide (pure or in solution)
2-Hydroxy-2-methylpropanenitrile
Isodrin
Mercury fulminate
APPENDIX X
2-Methylaziridine
Methyl hydrazine
Methyl isocyanate
Methyl parathion
2-(1-Methylpropyl)-4,6-dinitrophenol
α -Naphthylthiourea
Nickel carbonyl
Nickel cyanide
Nicotine (and salts)
Nitric oxide
p-Nitroaniline
Nitrogen dioxide
Nitroglycerine
N-Nitrosodimethylamine
N-Nitrosomethylvinylamine
Octamethylpyrophosphoramide
Osmium tetroxide
Parathion
Phenylmercury acetate
Phenylthiourea
Phorate
Phosgene
Phosphine
Potassium cyanide
Potassium silver cyanide
Propanenitrile
Propargyl alcohol
Selenourea

Silver cyanide
Sodium azide
Sodium cyanide
Sodium fluoroacetate
Strychnine (and salts)
Tetraethyl lead
Tetraethyl pyrophosphate
Tetranitromethane
Tetraphosphoric acid, hexaethyl ester
Thallic oxide
Thallium (I) selenite
Thallium (I) sulfate
Thiodiphosphoric acid, tetraethyl ester
Thiofanox
Thiophenol
Thiosemicarbazide
Toxaphene
Trichloromethanethiol
Vanadium pentoxide
Warfarin (and salts, when either are present at concentrations greater than 0.3%)
Zinc cyanide
Zinc phosphide (when present at concentrations greater than 10%)

Appendix J – Chemical Glove Chart

Type of Glove	Advantages	Disadvantages	Use Against:
Natural Rubber	Low cost, good physical properties, dexterity	Poor vs. oils, greases, organic, may be poor quality	Bases, alcohols, dilute aqueous solutions, fair vs. adehydes, ketones
Natural rubber blends	Low cost, dexterity, better chemical resistance than natural rubber vs. some	Physical properties frequently inferior to natural rubber	Same as natural rubber
Polyvinyl chloride (PVC)	Low cost, very good physical properties, medium chemical resistance	Plasticzers can be stripped, frequently imported, may be poor quality	Strong acids and bases, salts, other water solutions, alcohols
Neoprene	Medium cost, medium chemical resistance, medium physical resistance	NA	Oxidizing acids, anilines, phenol, glycol ethers
Nitrile	Low cost, excellent physical properties, dexterity	poor vs. benzene, methyl chloride, trichloroethylene, many ketones	Oils, greases, aliphatic chemicals, xylene perchloroethane,
Butyl	Specialty glove, polar organics	Expensive, poor vs. hydrocarbons, chlorinated solvents	Glycol ethers, ketones, esters
Polyvinyl Alcohol (PVA)	Specialty glove, resists a very broad range of organics, good physical properties	Very expensive, water sensitive, poor vs. light alcohols	Aliphatics, aromatics, chlorinated solvents, ketones (except acetone) esters, ethers
Fluoroelastomer (Viton)	Speciality glove, organic solvents	Very expensive, poor physical properties, poor vs. some ketones, esters, amines	Aromatics, chlorinated solvents, aliphatics and alcohols
Norfoil (Silver shield)	Excellent chemical resistance	Poor fit, easily punctures, poor grip, stiff	Use for hazmat work

Appendix K – Hazards Review Form

List all the hazards (H): Chemical, physical, biological, mechanical, stress, noise, electrical, radiation, and hi/low pressure, associated with this experiment.

Describe the precautions (P) needed for each hazard and the appropriate emergency procedures (EP).

Make a check in the left margin as these are described to your students.

Subject:_____ Class: _____

Experiment:_____

____ H1 _____

____ P1 _____

____ EP1 _____

____ H2 _____

____ P2_____

____ EP2 _____

____ H3 _____

____ P3 _____

____ EP3 _____

____ H4 _____

____ P4_____

____ EP4 _____

On the reverse side, note any additional hazards, necessary precautions, or relevant procedures noted during the experiment.

Teacher's Name:_____ Date:_____

Appendix L – Laboratory Incident Report

LABORATORY INCIDENT REPORT
(To be completed with the Laboratory Supervisor/Principal Investigator)
(i.e., injury, illness, hazardous substance exposure, fire, spill)

Name of Person Involved in Incident (if applicable): _____

☐ Employee ☐ Student ☐ Graduate Student ☐ Visitor

Laboratory Supervisor: _____

Class/Lab:

Time & Date of Incident:

Location of Incident:

Details of Incident: (nature of incident, e.g., illness, accident, injury. If injury occurred, indicate circumstances and who was involved. Indicate any substances (e.g., amount and kind of chemical) or object involved.)

What action was taken: (What was done to protect individuals or clean up substance? Also indicate if emergency personnel were contacted and if transport to hospital occurred.)

Investigated by:

_____ (Print Name)

_____ (Signature)

_____ (Date)

Appendix M – Chemical Spill Protocols

ALL spills must be reported to the Principal Investigator, Laboratory Hygiene Officer, and the Environmental, Health & Safety Office.

Acid Spills (hydrochloric or sulfuric acid):

1. Neutralize spill with sodium bicarbonate/baking soda.
2. Wait until bubbling/fizzing has stopped.
    a. When using a neutralizing spill kit, the kits are buffered and will not have a bubbling action. Be careful not to over-neutralize.
3. Test pH of the spill after the neutralization reaction has stopped with pH paper.
4. Once pH is between 6 and 9, the material can be transferred into an appropriate secondary container for disposal.
5. Wipe all surfaces with a sponge and wash all of the material down the sink.

**Some acids cannot be neutralized and will require special procedure for spill clean-up.

Examples: chromic acid and hydrofluoric acid.

Base Spills (Sodium or Potassium hydroxide):

1. Neutralize spill with a DILUTE acid (such as vinegar, 3M HCl, citric acid).
2. Wait until bubbling/fizzing has stopped.
    a. When using a neutralizing spill kit, the kits are buffered and will not have a bubbling action. Be careful not to over-neutralize.
3. Test pH of the spill after the neutralization reaction has stopped with pH paper.
4. Once pH is between 6 and 9, the material can be transferred into an appropriate secondary container for disposal.
5. Wipe all surfaces with a sponge and wash all of the material down the sink.

Organic Spills (Acetone, Benzene, Ethylene glycol, Formaldehyde, Methylene chloride, Perchloroethylene, Toluene, Xylene, 1,3-butadiene)

1. Use an absorbent medium such as sand or vermiculite to absorb the spill and prevent runoff.
2. Transfer the spilled material into an appropriate secondary container.
3. Mark the container with the Hazardous Waste label and contact the EHS Office.

Solid Waste:

1. Most solid chemical spills can be swept up and transferred directly to a secondary container after the spill occurs.
2. Mark the container with a Hazardous Waste label and contact the EHS Office.

Metal Wastes:

Solutions containing the following metals cannot go down the sink under any circumstances: **arsenic (As), barium (Ba), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), molybdenum (Mo), nickel (Ni), selenium (Se), silver (Ag), and zinc (Zn)**. Special waste containers will be placed in the lab to collect each type of metal for subsequent disposal by EHS personnel.