Texas A&M International University

Chemical Hygiene Plan

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SECTION 1.0: INTRODUCTION

Texas A&M International University (TAMIU) strives to assure that a safe working environment exists in all instructional and research laboratories. Despite the variety of potential hazards in laboratories, especially in labs where hazardous materials are used, proper observance of the safety practices and guidelines outlined in this Chemical Hygiene Plan (CHP) by all faculty, staff, and students will minimize the risk of a laboratory related incident.

1.1 NONCOMPLIANCE WITH SAFETY PROCEDURES

Experiments can only be authorized by the professor or research instructor teaching the course. Any student who engages in unauthorized experimentation, or who seriously disregards safety, thereby endangering themselves or others can face disciplinary actions in accordance with the university's due process procedure as outlined in the University's Student Handbook.

Laboratory supervisors, laboratory technicians, faculty, and the department chair can be held responsible if a failure on their part to enforce safety procedures results in an injury. Failure to enforce safety procedures may result in appropriate progressive disciplinary actions in accordance with university policy. Although this policy may seem harsh, the consequences of failing to enforce safety procedures are simply too great to allow negligence.

1.2 TEXAS HAZARD COMMUNICATIONS ACT

The following is a brief explanation of TAMIU's Hazard Communication Program. Please refer to the actual Hazard Communication Plan for further details.

- **Training**

  The Hazard Communication (HazCom) Program requires employees to be trained in the hazards of the chemicals used in their employment.

  1. All personnel, including students, who receive compensation from the University, and routinely use or handle hazardous chemicals, must undergo training in the HazCom Program. This training will be conducted for new employees as part of the employee orientation process via TrainTraq.
  2. Laboratory instructors or professors must inform students of the hazards associated with the chemicals used for class assignments.

- **Safety Data Sheet (SDS) Inventory**

    1. The HazCom Program requires each department that possesses or uses hazardous chemicals to have access to Safety Data Sheets (SDS's) of the hazardous chemicals in their laboratories.
    2. The Chemistry Department maintains an extensive file of SDS's. SDS's may also be found online on search engines such as, but not limited to, sdssearchengine.com, msds.com, and sdslibrary.com. The Office of Environmental Health and Safety (EH&S) may also provide additional assistance and training - as needed - in interpreting chemical labels and SDS's. EH&S may also provide guidance on the proper handling and disposal of hazardous chemicals.

SECTION 2.0 GENERAL SAFETY PROCEDURES

The following items are safety guidelines that must be adhered to at all times while working in laboratories containing hazardous materials.

1. Proper protective clothing must be worn at all times when handling potentially hazardous chemicals.
2. Work with hazardous materials only after learning the flammability, reactivity, corrosive, and toxicity hazards.
3. Properly heat solutions in test tubes so there is minimal hazard to self or neighbor. A properly adjusted flame from a Bunsen burner is often difficult to see because of its blue color, always be aware of the location of the flame, and take care to avoid it. Turn the burner off when it is not being used.
4. Do not force glass tubing into rubber stoppers. Lubricate fire polished tubing, and protect hands with a heavy cloth towel when inserting tubing.
5. Use only boro-silicate (PYREX, KIMAX, etc.) containers for heating solutions.
6. ALWAYS use a rubber safety bucket when transporting containers of hazardous materials or large amounts of glass equipment from storerooms.
7. At the end of the lab period or each research period clean the bench tops, washing them free of chemicals and wipe them dry with a paper towel.
8. Long hair shall be secured so that it will not present a personal hazard while working in the laboratory.
9. Learn where the nearest exits are located. Become familiar with alternative evacuation routes from the lab room in case of a fire or other emergencies block the primary exits.
10. Follow the instructions for proper disposal of laboratory waste. The lab instructor will provide containers for wastes that can not be poured into the sink or placed in the trash.
11. Note the location of safety equipment in the lab, e.g. safety shower, eye wash station, fire extinguisher, first-aid kit, and spill kit. Also, the area around each item should be kept clear of obstructions.
12. While working in the laboratory, avoid contact with chemicals. Do not place pencils, pens, fingers, or anything else in your mouth or eyes, as they may be contaminated. Wash your hands, arms, and face immediately after completing lab work.

SECTION 3.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

While conducting laboratory work, individuals are exposed to many potential hazards. The most common of which are chemical hazards. The adverse health effects caused by chemicals can be minimized with the use of personal protective equipment (PPE). The following section pertains to the PPE which will be required while working in laboratories.

3.1 PROTECTIVE CLOTHING

Proper protective clothing must be worn at all times when handling potentially hazardous chemicals. Exposed skin on arms, legs, and feet is particularly susceptible to injury by the splashing of hot, corrosive, or flammable liquids.

- Shorts, sleeveless garments, sandals and open-toed shoes are prohibited in the laboratory.
- In certain situations, depending on the hazards of the chemicals, lab coats will be required and they should be made of cotton and not of synthetic material. Lab coats should not be worn outside of the work area.

Chemical resistant gloves are required when dispersing chemicals from containers. Latex gloves provide adequate protection for most laboratory chemicals, however, latex gloves will not provide protection from all chemicals. For example, special gloves are required for handling liquid bromine and hydrofluoric acid.

Loose, long clothing should be secured and is not permitted when working near rotating machinery or open flames. Long hair should be secured as short and as tightly as possible when working near rotating machinery or open flames.

3.2 SAFETY GLASSES

Splash resistant safety goggles of an approved type (ANSI Z87.1) must be worn by all persons in laboratories using hazardous materials. Regular eyeglasses cannot be substituted for approved eye wear and must be worn in conjunction with splash resistant goggles.

Contact lenses are approved for use in the laboratory, however, if contact lenses are worn, they must be worn in conjunction with splash resistant goggles.

For laboratories where there is only an impact hazard to the eye and no possible exposure to hazardous materials, approved (ANSI Z87.1) impact resistant safety glasses can be

substituted for splash resistant goggles. It will be at the discretion of the Department Chair to approve this substitution.

NOTE

It is imperative to enforce the requirement that all persons in laboratories wear the required PPE while working with hazardous materials. If a student forgets to bring safety goggles to class, he/she must secure a pair before entering the laboratory. Individuals who repeatedly fail to wear the required PPE should be asked to leave the laboratory.

SECTION 4.0: EMERGENCY EQUIPMNET & PROCEDURES

4.1 SAFETY SHOWERS / EYE WASH STATIONS

All persons working in a laboratory should familiarize themselves with the location and the operations of the safety shower and eye wash station. Access to the shower station should not be blocked and a 3 ft. x 3 ft. floor area beneath each safety shower shall be kept clear of equipment and other obstructions.

Safety showers should be tested at least once a week. Articles of clothing (e.g., coats, jackets, sweaters, etc.) or other objects must not be hung from safety showers.

4.2 FIRE EXTINGUISHERS

Laboratory supervisors should know the locations of fire extinguishers and should be trained in their proper usage. Contact the Office of Environmental Health and Safety for information on fire extinguisher training.

Articles of clothing (coats, jackets, sweaters, etc.) or other objects should never be hung on or cover a fire extinguisher.

Each use of a fire extinguisher, no matter how brief, should be reported to the department's administrative office and to the Office of Environmental Health and Safety. A Work Order must be submitted to the Physical Plant to exchange out the discharged fire extinguisher.

Fire extinguishers will be inspected only by qualified personnel.

4.3 EMERGENCY PROCEDURES

All laboratory occupants should know the location(s) of the eyewash fountain and the safety showers, fire extinguisher and fire blanket, as well as the location(s) of the nearest building exit(s), and should familiarize themselves with alternative building evacuation routes.

If chemicals should come in contact with the eyes, wash the eyes for 15-20 minutes; seek medical attention immediately. Permanent eye damage can occur in LESS THAN 15 SECONDS.

In case of a fire or a serious accident, report the emergency to the University Police Department at extension 2911. Individuals should go to the Student Health Center for treatment of minor cuts, burns, and minor chemical exposures if during operational hours.

UPD can provide transportation to the Student Health Center upon request. For injuries requiring off-campus medical attention, UPD will contact the Laredo Fire Department Ambulance to provide transportation to the hospital.

Lab instructors or Lab Techs are to fill out **an incident report** for all incidents and file them with the Office of Environmental Health and Safety.

For the benefit of maintenance and emergency personnel, a sign bearing the names and telephone numbers of laboratory personnel to be contacted in the event of an emergency should be posted outside each laboratory. Also, if the laboratory contains special equipment or hazardous equipment, emergency shutdown procedures should be posted in the laboratory.

NOTE

The body reacts differently to chemical exposures. When in contact with an acid, the skin will produce a protective protein layer which resists further penetration of the acid. Nerves will react with the acid causing a painful sensation.

Skin contact with an alkali metal hydroxide is more hazardous because the protective protein barrier is not formed and nerves will not react as strongly, therefore, deeper tissue damage occurs because the pain is less and the individual is not aware of the seriousness or degree of exposure.

Even a weak solution of NaOH or KOH can saponify fat and attack skin to a degree that fingerprints disappear. Skin contact with phenol may not be painful, but produces a whitening of the area and a severe burn.

SECTION 5.0 COMPRESSED GAS PROCEDURES

Compressed gasses are part of everyday life at the university, ranging from common oxygen cylinders to specialty gas cylinders. No matter what type of compressed gas is being utilized, special handling requirements must be adhered to.

One of the most important requirements is the restriction on the size of the cylinder. With only a few exceptions, cylinders containing toxic gases shall not exceed a lecture-size gas bottle (approximately 2" x 12"). Cylinders that contain toxic gases shall only be used with adequate ventilation, and shall only be used when appropriate monitoring equipment is in use.

5.1 SECURING CYLINDERS

Tanks or cylinders of compressed gases must be properly secured in an up-right position at all times. This includes spare and empty tanks. Tanks must NOT be left standing freely or without protective valve caps.

The preferred method of securing compressed gas cylinders is by enclosure within a length of chain firmly anchored at both ends to a stone or masonry wall. An alternative method of securing is with a canvas tank strap securely clamped to an immovable table or bench top. In either case, the anchor points of the chain or strap should be about two-thirds of the way up the tank.

5.2 HANDLING PRECAUTIONS

The following are minimum guidelines for working with compressed gas cylinders and should be adhered to at all times.

1. Proper precautions should always be observed when using or moving compressed gas cylinders.
2. Each tank must be properly and permanently identified when received. Never accept a cylinder in which the name of the contents is not clearly legible. Do not rely on color codes for tank identification.
3. Proper cylinder carts must always be used for moving or relocating tanks. TAMIU orders cylinders such that assumption that vendor will deliver cylinders to location of use. Do not roll cylinders.
4. The CGA classifications of regulator fittings must match those of the tanks on which they are used. Other arrangements are hazardous and are not permitted. Required CGA classifications for most gases are provided in compressed gas catalogs which are available in the departmental office.
5. Always check the regulator before attaching it to a cylinder. If the connections do not fit together easily, a wrong or inadequate regulator is being used.

6. The threads and mating surfaces of the regulator and hose connections should be cleaned before the regulator is attached.
7. Always use a cylinder wrench or another tightly fitting wrench to gently tighten the regulator nut and hose connections.
8. Do not drop cylinders or permit them to strike anything violently.
9. Do not transport cylinders outside of buildings.
10. Protective valve caps SHALL be kept on the cylinders at all times except when the cylinder is actually being used or charged.
11. Cylinders SHALL not be transported without safety caps. A cylinder's cap should be screwed all the way down on the cylinder's neck ring and should fit securely. Do not lift cylinders by the cap. The cap is for valve protection only.
12. Do not use cylinders for any purpose other than the proper intended use.
13. Open cylinder valves SLOWLY. Do not use a wrench to open or close a hand wheel type cylinder valve. If it cannot be operated by hand, the valve should be repaired BY THE GAS VENDOR OR A QUALIFIED INDIVIDUAL.
14. Do not attempt to repair cylinder valves or their relief devices while a cylinder contains gas pressure.
15. Before attaching cylinders to a connection, be sure that the threads on the cylinder and the connection mate are of a type intended for the gas service.
16. Do not permit oil or grease to come in contact with cylinders or their valves.
17. Cylinders should be stored in a well ventilated area away from flames, sparks or any source of heat or ignition. Keep cylinders away from electrical circuits.
18. Do not expose cylinders to an open flame or to any temperature above 130 degrees F.
19. Oxygen and nitrous oxide cylinders (empty or full) in storage should be separated from flammable or fuel-gas cylinders and combustible materials by a minimum distance of 20 feet or by a barrier at least 5 feet high having a fire-resistance rating of at least one-half hour.
20. Full and empty cylinders of all gases should be stored separately and identified by signs to prevent confusion.
21. Cylinders stored outdoors should be protected from the ground to prevent bottom corrosion. They should also be protected from direct sunlight, continuous dampness, or salt or other corrosive chemicals or corrosive vapors.
22. Do not "crack" (open and close quickly before attaching regulator) hydrogen, fuel-gas, pyrophoric or toxic gas cylinder valves - just wipe out the outlet connections with a clean, dry, lint-free cloth.
23. Attach the regulator securely before opening the valve.
24. Stand to the side of the regulator when opening the cylinder valve TO PREVENT INJURY IF THE REGULATOR FACE BLOWS OUT.
25. Remove leaking cylinders or cylinders with stuck valves to a safe, well ventilated location (such as a walk-in hood or secure outdoor area), and call 2756 for assistance/advice immediately.
26. Store cylinders of toxic gas in an approved ventilated gas cylinder cabinet.

27. Proper traps should always be provided when gases are bubbled into liquids or reaction mixtures to prevent possible back flow of the liquid into the gas cylinder. In addition, check valves are recommended for all compressed gas supply lines.
28. Properly designed tank trucks should be used for transporting large cryogenic containers of liquid nitrogen. In order to prevent tampering by unauthorized personnel, cryogenic containers should not be left unattended in the corridor outside the departmental liquid nitrogen dispensing facility.

NOTE

BEWARE of cylinders stored outside during the summer. The caps with vertical slits make great places for wasps to build nests. Tap the cap gently and step back prior to removing the cap.

SECTION 6.0 SPECIAL WORKING REQUIREMENTS

6.1 WORKING ALONE

There will be occasions in which students need to work in the lab other than scheduled hours. The following procedures are to be adhered to when working in laboratories during unscheduled hours.

1. A permit completed by the lab instructor is required while working in the lab during non-laboratory hours (See Attached form).
2. No student in a lower-division lab may conduct experimental procedures or work alone without permission from the researcher / lab supervisor or a completed permit
3. Graduate work shall be conducted under the direction of the research advisor.
4. No persons other than class members are allowed in the lab without permission of the instructor.

6.2 UNATTENDED OPERATIONS

Frequently, laboratory operations are carried out continuously or overnight. It is essential to plan for possible interruptions in utility services such as electricity, water, and gas. Operations should be designed to be fail-safe, and plans should be made to avoid hazards in case of failure. Whenever possible, arrangements for routine inspection of the operation should be made and, in all cases, the laboratory lights should be left on and an appropriate sign placed on the door.

One hazard frequently encountered is the failure of cooling water supplies. A variety of devices can be used to automatically regulate water pressure to avoid surges that might rupture the water lines or monitor the water flow so that its failure will automatically turn off electrical connections and water supply valves.

SECTION 7.0 CHEMICAL STORAGE / LABELS / DISPOSAL

7.1 GENERAL PROCEDURES

The following are minimum guidelines and apply to all laboratories using hazardous materials.

1. All containers of chemicals must be properly identified by permanently affixed labels that include the full chemical name and associated hazards of the chemical.
2. Storage of chemicals according to alphabetical order is not the best storage system as this may place incompatible chemicals next to one another, or may cause large containers to be stored on a top self. Instead, group the chemicals according to hazard class with larger containers near the bottom of the shelf.
3. All containers of flammable solvents larger than 1 liter should be stored in approved metal storage cabinets. Flammables and strong oxidizers should be separated.
4. Containers of non-flammable chemicals and reagents should be stored in cabinets or on shelves provided for that purpose. Storage of acids and bases shall be segregated and stored near floor level.
5. Proper, skid-proof footstools or stepladders shall be used for reaching upper shelves. Do not stand on chairs or other easily movable objects.
6. Glass containers should never be stored directly on the floor.
7. Return lab equipment, chemicals and miscellaneous items to their proper storage locations when no longer needed. Do not store chemical containers on bench tops.
8. Do not store items in a fume hood or biological safety cabinet.

7.2 HAZARDOUS MATERIALS

The following procedures are guidelines for laboratories using or storing hazardous materials.

1. The total inventory of flammable liquids in a laboratory must not be excessive. As a guide to acceptable quantities of stored chemicals, the National Fire Prevention Association (NFPA) has set limits for storage of flammable liquids in laboratories.

   The following are storage limits established for TAMIU laboratories:
   - Maximum individual container sizes for flammable liquids are 1 gallon for unprotected (I.e., exposed glass) containers and 5 gallons for metal safety cans.
   - No more than 5 gallons of flammable liquids may be stored in any individual laboratory in unprotected containers.
   - No more than 10 gallons (total quantity in any type of container) may be kept outside of a flammable chemical storage cabinet.

2. The doors of the flammable chemical cabinets should have positive-catch latches (i.e., a handle must be turned, not merely pulled, to open the door).
3. Flammable chemicals requiring refrigeration must be stored only in approved explosion-proof refrigerators or freezers.
4. Substances with particularly noxious or toxic vapors must be stored inside a ventilated storage cabinet or, if necessary, in an operating fume hood as a temporary solution. If the fume hood is also to be used for experimental work, then it should be provided with a separate metal cabinet for chemical storage.
5. Because of the possibility of formation of explosive peroxides, the storage of opened containers of ethers derived from primary and secondary alcohols, is particularly hazardous. The containers of peroxide forming chemicals (i.e., ethyl or isopropyl ether) should be labeled with the date they are first opened, and the entire contents shall be used or disposed of within 6 months after first opening the container. Unopened containers should be disposed after 12 months of storage. Examples of peroxide forming chemicals are listed in Appendix E.
6. Potential ignition sources, such as flames or non-explosion-proof electrical motors, are not allowed in areas where flammable chemicals are used or stored.
7. Incompatible chemicals, such as strong acids and bases, or strong oxidizing agents and organic reagents, must not be stored in close proximity.
8. Rubber bottle carriers or carts (available from the chemical stock-room) are required for transporting glass containers of chemicals in building corridors.

7.3 LABELS

The following guidelines pertain to chemical identification.

- Date all chemical containers when the chemical is received and when first opened.
- Label secondary containers to clearly identify its contents and the date it was prepared.
- Do not use a chemical from an unlabeled container.
- Label all containers, freezers, lab entrance doors and other locations as necessary to indicate specific hazards (e.g. "carcinogen", "biohazard").

7.4 WASTE CHEMICAL DISPOSAL

The following guidelines are procedures for disposing of hazardous materials.

1. In research laboratories, where many unusual chemicals are used, the responsibility for disposal of unused reagents and waste reaction products is that of the researcher or their faculty advisor, because in most cases only these individuals know how to handle the materials safely. The Office of Environmental Health and Safety should be contacted for disposal options.

2. Disposal of waste by drain will only be permitted for small quantities of water-soluble, non-regulated waste. This is providing that the waste will not hydrolyze to form volatile, toxic, or malodorous materials. Consult with the laboratory supervisor prior to pouring any material in the sink.
3. Acids and bases may be disposed by drain only after the material has been neutralized and there are no other hazardous constituents.
4. Regulated hazardous waste e.g., flammable liquid wastes must not be poured into sinks or other sewer drains, but should be poured in approved containers. Laboratories that generate large volumes of regulated hazardous waste (exceeding 10-20 gallons per week), should pour the material in 5 gallon or 30 gallon containers, rather than in 1 gal. glass containers, prior to disposal.
5. A Waste Disposal tag (available from the Office of Environmental Health and Safety), should be attached to the container and should provide a list of the container's contents. Contact the Office of Environmental Health and Safety for assistance with hazardous material disposal.
6. All empty chemical containers should be triple rinsed before discarding. The rinsate shall be collected and placed in a container according to hazard class (e.g. flammable rinsate, corrosive rinsate, etc.) for storage purposes. The labels of the empty container shall be marked out and the containers placed in the trash.

Mercury

- All work involving metallic mercury should be performed over trays or pans with turned-up edges to confine any mercury which may be spilled.
- Contaminated mercury should be stored in tagged, closed bottles until a sufficient quantity has been accumulated.

7.5 CHEMICAL CLEAN-UP

The following guidelines are clean-up procedures to be used in the laboratory

1. To minimize the risk of a hazardous material spill take only the minimum amount of chemicals needed.
2. Dispose of excess or waste chemicals in appropriately LABELED WASTE CONTAINERS as directed by the instructor.
3. Label all waste containers in a manner that "non-science" persons will know their contents.
4. As directed by the laboratory supervisor, flush SMALL AMOUNTS of approved liquid chemicals down the drain with copious amounts of water.
5. Place broken glass in designated containers.
6. Clean up minor spills with paper towels and water. For major spills, under the supervision of the lab instructor, use appropriate spill control equipment and contact UPD at extension 2911.
7. Sulfur or a mercury spill kit should be used to contain mercury if there is a mercury accident such as a broken mercury thermometer.

SECTION 8.0: CHEMICAL HAZARD & HAZARD CONTROLS

The degree to which a chemical exposure adversely affects the human body is contingent upon the dose of the chemical; the duration of the exposure; and the route in which the chemical entered the body. The minimization of exposure to hazardous chemicals should be a priority to all laboratory personnel. This section discusses the primary Routes-of-Entry (inhalation, ingestion, absorption, and injection) and certain methods for controlling the chemical hazards.

The following are brief descriptions of common causes of laboratory related incidents. Unexpected and possibly dangerous situations can result from one or more of the following:

• Incorrect chemical handling procedures • Incorrect reaction temperatures • Incorrect amounts of chemicals • Incorrect order of addition of two or more substances	• Incorrect rate of addition of two or more substances • Incorrect dilution of concentrated acids • Using one or more incorrect substances • Using expired chemicals

8.1 INHALATION EXPOSURE

- DO NOT INHALE VAPORS.
- Experiments that generate vapors should be performed in a hood.
- Lab windows and doors should be kept closed at all times so that hoods work properly.
- Large objects should not be placed in hoods. Hoods should only be used as temporary storage areas for equipment and chemicals.

8.2 INGESTION EXPOSURE

- NEVER pipette by mouth! Use a pipette bulb.
- No eating, drinking, or application of cosmetics is allowed in the lab.
- Never use chemical equipment as containers for food or drink.
- Tobacco products are PROHIBITED in the lab!
- Never taste, nor deliberately inhale any laboratory chemical. Exception: special experiments may involve odors of non-hazardous substances.

8.3 ABSORPTION EXPOSURE

- Wear appropriate PPE for the procedure.
- Conduct procedures so as to avoid splashes and spills.
- IMMEDIATELY wash any splashed chemical from your skin.

8.4 INJECTION EXPOSURE

Most exposures from injections are caused by improper handling of needles and broken glassware. Laboratories using needles must have a proper disposal container for needles. Used needles will not be placed in the trash or any other unapproved container. Individuals should use prudent care when handling needles and other sharp objects.

Laboratories should also have an approved container for the disposal of broken glass. Scoops and hand brooms should be available to safely clean the area of broken glass.

8.5 CHEMICAL HAZARD CLASS

Chemicals are categorized according to their hazard class. There are four main classes for chemical hazards. The following are simplistic definitions of the chemical hazard classes:

1. **Flammable** - Any material which has a flashpoint of < 100F and burns in air, whether gas, liquid, or solid. A flammable gas when mixed with air can explode if ignited.
2. **Corrosive -** Any material which will attack and irreversibly damage human tissues, such as eyes, skin or mucous membranes, as well as other substances such as metal.
3. **Poison (Toxic)** - The ability of a substance in small quantities to cause severe or fatal injuries by inhalation, absorption, or ingestion.
4. **Reactive** - A chemical substance or mixture that may vigorously polymerize, decompose, condense, or become self-reactive under conditions of shock, pressure or temperature. Examples of reactive materials are as follows:
    - Explosive Material
    - Organic Peroxide
    - Water-Reactive Material

8.6 HAZARD CLASS RATINGS

Chemical hazards are communicated through container labels. The most common types of hazard labels are the NFPA 704 Diamond and the HMIS Label.

The NFPA 704 (National Fire Protection Association) is a diamond-shaped label with colors, numbers and symbols to communicate chemical hazard information. The HMIS label (Hazardous Material Information System) is similar to the NFPA's system in which the differences between the two labels is that the HMIS label is rectangular in shape and also utilizes symbols indicating the PPE to be worn while working with the chemical.

See Appendix G for Examples of NPFA 704 and HMIS labels.

SPECIAL CONCERNS

ETHERS:

- Ethers are extremely volatile and flammable.
- Vapors are flammable and may result in flashback.
- Form potentially explosive peroxides upon exposure to air and light.
- Must be stored in well ventilated, cool area.
- DO NOT store in refrigerator unless it is designed for ether

PERCHLORIC ACID:

- Reacts violently with organics.
- Must be stored away from wood and other organic material.
- Must be used in a special washdown fume hood

PICRIC ACID: Shock sensitive and potentially explosive when DRY store wet.

Reminder: Acids and basis are **always added to water**. Slowly add chemicals carefully stirring to allow cooling.

SECTION 9.0: MISCELLANEOUS LABORATORY PROCEDURES

9.1 VENTILATION

- All laboratory fume hoods should provide adequate air movement, and should be fitted with moveable sashes.
- At least one fume hood in each laboratory should be run continuously.
- Fume hoods must be inspected on a regular basis.
- To prevent entry of sewer gases into laboratories, traps in floor drains and in cup sinks on laboratory benches and fume hoods should be kept full by pouring 1 liter of water into the drain at least once a month.

9.2 ELECTRICAL

- Adequate electrical circuits should be provided in each laboratory to prevent overloading.
- Electrical cords and cables should be examined periodically for signs of wear or fraying, and replaced if necessary.
- Electrical cords and instrument cables must not be located near potential heat sources, or in locations where they may be subject to wear by friction, or on floors in traffic areas.
- In laboratories where large numbers of electrical outlets are in permanent use, each outlet should be labeled.
- Access to circuit breaker panels in laboratories must remain unobstructed at all times.
- Never use an electrical plug in which the ground leg is damaged or has been removed.

9.3 VACUUM EQUIPMENT

- All glass vacuum vessels larger than 100 cm3 must be taped or enclosed within explosion-proof shields. This includes all Dewar flasks and vacuum desiccators.
- All belt-driven rotary vacuum pumps must be fitted with belt guards.
- Vacuum pumps should not be used inside cabinets or under low bench tops unless adequate ventilation has been provided.

APPENDIX A: PROCEDURES FOR BIOLOGICAL FIELD RESEARCH

All persons using laboratories at TAMIU are bound to the safety procedures stated in the University's Chemical Hygiene Plan. This appendix deals with specific procedures pertaining to biological field research and is designed to be a supplement to the Chemical Hygiene Plan. Refer to various sections within the Chemical Hygiene Plan to obtain information on safety procedures not covered in this appendix.

1.0 GENERAL FIELD WORK

(from Caesar Kleberg Wildlife Research Institute Graduate Guidelines, Jan. 1991)

These safety guidelines cannot cover all possible emergencies or accidents that might occur in the field. However, they do cover potential situations, appropriate safeguards, and proper reactions should you or your fellow field workers become injured. The safety of staff, students, and field assistants is a paramount concern in field operations.

1.1 Behavior

Field workers are expected to behave in a responsible manner at all times during field work. They should not engage in any activity that will endanger themselves or other individuals. Some field activities require extra precautions on the part of the participants. Some of these precautions are described under the heading "Specific" below; others will be detailed as needed by the responsible faculty or staff member.

1.2 Responsibility

Personal safety is an individual responsibility. The staff members cannot assume responsibility for a student who cannot, or will not, behave responsibly. Further, each student should obtain/review appropriate health insurance to provide coverage in the event of an incident.

1.3 Incident Procedures

The first responsibility in the event of an incident is to the victim. The following procedures should be followed, as appropriate:

1. Render first aid. Make sure the victim is breathing; clear the airway if he/she is not. If the victim is still not breathing after clearing visual blockage of the airway, conduct rescue breathing or cardio-pulmonary resuscitation (CPR). Stop bleeding by applying direct pressure to wounds. Elevate bleeding extremities when possible.
2. Proceed with other first aid procedures as appropriate.

3. If necessary, arrange for professional assistance in transporting the victim to a medical facility by calling 911.
4. Report accidents as soon as possible to the faculty or staff member in charge.

2.0 SPECIFIC FIELD WORK

This section describes some of the most common health and safety concerns for field workers in South Texas and the appropriate actions to insure safety.

2.1 Poisonous Snakes:

Avoid poisonous snakes when possible. It is recommended to wear snake-protecting chaps or leggings whenever you are doing fieldwork in areas with poisonous snakes. In case of a snake bite, proceed immediately to the nearest medical facility.

Refer to 3.3 of Appendix A for information regarding first aid procedures for snake bite victims.

2.2 Power Tools and Hand Tools

Wear eye-protecting goggles whenever you handle any tools that may cause chips or other particulates to fly at your face. Wear gloves to prevent burns, abrasions, cuts, and other injuries. Wear other protective clothing, as appropriate, for the job and equipment.

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2.3 Rabies

It is recommended that field workers who have the potential of coming in contact with wild animals (particularly canines, felines, and small furbearers) be vaccinated against rabies.

2.4 Vehicles

1. University vehicles will be operated only by university employees who possess a valid Texas driver's license, and only with permission of the appropriate department. Drive in a responsible manner, following posted speed limits and other laws, including the use of seat belts.
2. Do not drive vehicles that are unsafe to operate. Each department should have a procedure that requires inspection of vehicles before and after each use.
3. The consumption of alcoholic beverages or the use of illegal drugs while driving University vehicles is illegal and prohibited.

4. All field vehicles should be equipped with standard first aid supplies. It is the responsibility of the person using the vehicle to ensure that the supplies are on board and in good condition.
5. Immediately report vehicle accidents to the staff member in charge.

2.5 Handling Large Animals

Both lab and field research can involve the handling of large, wild animals. Wear such protective clothing (goggles, pads, etc.) as necessary to ensure that you are protected from hooves, horns, antlers, teeth, claws, etc. Ensure that sufficient personnel are on hand to subdue animals in a safe manner. It is better that an animal escape rather than a person be injured.

2.6 Health Problems Related to Sunlight and Temperature

Wear clothing appropriate to the type of work, habitat, and weather. Guard against heat stroke or heat exhaustion by avoiding intense physical activities during the heat of the day. Protect against sunburn with proper clothing and/or sunscreen. Carry plenty of water (1 gallon per person per day) when you conduct field work during hot periods.

2.7 Travel into Remote Areas

When possible, do not travel alone. Bring a CB radio or cellular phone (if service is available). Let someone know exactly where you are going and when you plan to return. Bring extra rations of food, water, and supplies if possible. Bring a first aid kit, and also be sure to bring adequate equipment for the type of terrain you will encounter.

If you are going to be on TAMIU property in the undeveloped brush on east side of campus (otherwise known as the back 40), it recommend to inform UPD before entering this area. They will need to know who is going, how long trip is intended, if there are kids, what time you should return, if anyone is allergic to something out there, etc.

3.0 SPECIAL CONCERNS

3.1 Africanized ("killer") Bees

The following information includes general guidelines, practical information, and recommendations for dealing with Africanized honey bees in the field.

1. Wear protective clothing during field work (long-sleeved shirt, long pants, etc.).
2. A ski mask may also provide some facial protection. A mask would be easy to carry ,and could be put on quickly in case of an encounter. Be sure the mask does not obscure your vision.
3. Bring a first aid kit with a sting kit. If this is not possible, at least bring Benadryl (diphenhydramine) to reduce the severity of reaction to bee stings. If this

medication is to be given orally to an attack victim, be sure that the victim is conscious and able to swallow.
4. Never give anything by mouth to an unconscious person.
5. Be aware that you may encounter bees in the field. Develop a mental plan for escape and / or avoidance.
6. Develop an understanding of honey bee habits, and know where Africanized bees are likely to nest.
7. Don't get trapped without an exit.
8. If attacked, don't sit around trying to figue out what is happening. RUN! Once running, do not stop to swat bees; keep moving until inside a vehicle or until no more bees are following you (except maybe those hanging on).
9. If you or someone in your party can get to a phone, call 911, be prepared to provide authorities with the following information:
    a. Location of incident - before entering the field, it is a good idea to make a note of your location.
    b. Call-back number.
    c. Has anyone been stung? Is anyone being stung now? How many people are involved?
    d. Is the incident near a building (school, for example) with numerous occupants? Give name and address of school or building if possible.
    e. Specific location of the bees.

First Responder (untrained person) Approach to Bee Attack Victim:

1. Get someone to call 911 and report a massive bee attack, giving location (see above).
2. If you have access to a car, roll up all the windows and turn on the air conditioner full blast (cool air slows the activity of bees). If the victim is ambulatory, call 911 immediately.
3. Do not approach within 200 yards of the bees or their source (you should be able to see where they are coming from). If the victim is disoriented, has fallen, or is in any way incapacitated, they must be rescued by someone with full protective gear. Do not attempt to go into an attack without full protective gear; to do so would make you a victim also, and you would not be helping the person who was initially attacked. You would be better off going for help at this point.
4. The best you may be able to do is lead a victim (who is able to run) to a viable means of escape. Shout your location to the victim so that he/she will know which direction to run. Use a blanket or tarp for cover only if immediately available, but be careful not to obscure your own vision. Running immediately away from the bees into a car, a house, or some other enclosed shelter is the best hope for a victim.

5. If you are able to get the victim to a safe place, you should try to remove any stingers that are in the victim's skin. The venom sac attached to each stinger will continue to pump venom into the victim for a minute or more if not removed. Removing the victim's outer layer of garments may help, since stingers imbedded through the fabric will be dislodged. Remove individual stingers by scraping with a credit card or similar instrument. Do not pull out the stingers by pinching or tweezing, as this merely pumps in more venom from the sac.

3.2 Hantavirus

This virus is the causative agent of Hantaviral Pulmonary Syndrome (HPS), or "Four Corners Disease." This disease has a high mortality rate in humans, and cases have been documented in many states in the Western U.S., including Texas. In Europe and Asia, hantaviruses produce diseases which cause renal failure (such as Korean hemorrhagic fever), but strains in the U.S. have mainly caused pulmonary disease.

The primary vector of this disease in the U.S. is thought to be the Deer Mouse (Peromyscus maniculatus). Other rodents, such as rats and voles, are responsible for carrying this virus in other parts of the world, and therefore other rodent types in the U.S. may also carry hantavirus. In the Four Corners region of the Southwestern U.S., species such as the western chipmunk (Tamias spp.), brush mouse (Peromyscus boylii), pinyon mouse (P. truei), and house mouse (Mus musculus) have exhibited an antibody to hantavirus. While HPS seems to be a "new" disease, it is thought that hantavirus may be endemic to the U.S., and that increased rodent populations may be a contributing factor to the increased incidence of HPS in humans.

What makes this disease especially problematic for researchers in the field is its mode of transmission. Hantavirus is usually spread to humans by inhalation of aerosol particles of rodent feces or urine. Dry or arid habitats increase formation of these aerosols, and most of the cases reported thus far have originated in such climates. It may also be spread by contact with rodent saliva. The normal incubation period in humans is 12-16 days, but has a documented range of 5-42 days. Even brief exposure to the infected particles can cause disease.

The following guidelines from the Center for Disease Control (CDC) should be followed to minimize the risks of contact with hantavirus in the field:

1. Be cautious when working with or collecting wild deer mice and other rodents. Traps and animals should be handled with rubber or plastic disposable gloves. Avoid collecting specimens in buildings or other enclosures where dust particles may circulate. Use respiratory protection whenever it becomes necessary to handle live or dead wild-caught specimens.

2. Avoid contact with rodent urine or feces. Sanitize traps, cages, dissection instruments and other materials which have been in contact with rodents, preferably with a chlorine bleach solution. Launder any clothing that may have come in contact with rodents or their excreta. Dispose of carcasses in sealed "zip-lock" type bags and incinerate. Consider treating freshly prepared skins and skulls with an intense UV exposure, and skulls or other bones with bleach.
3. If symptoms of a febrile or respiratory illness occur within 45 days of a high risk exposure, immediate medical attention is imperative. The physician should be informed of the patient's possible exposure to hantavirus. A blood sample should be obtained and forwarded by the state health department to CDC for further diagnosis. Individuals who regularly contact wild rodents should have a baseline serum sample stored at -20 degrees C for reference.
4. Mammalogy students and field assistants should be particularly cautioned by teachers and supervisors about hantavirus exposure. All necessary precautions should be exercised.
5. Hantavirus may live in cell cultures. Care should be exercised in handling rodent blood and tissues unless they are known to be hantavirus free.
6. Established colonies of wild rodent species should be tested for hantavirus antibody. Blood samples from representative animals should be tested by CDC. No wild animals should be introduced into the colony thereafter unless they have been confirmed negative for hantavirus. Wild-caught rodents should be strictly quarantined from laboratory-bred rodents of the same or different species.

3.3 SNAKE BITES

3.3.1 Emergency Procedures for Snake Bites

If you are involved in activities requiring you to be out in the field where venomous snakes occur NEVER hike, camp or collect specimens unless accompanied by at least two companions. In the event of a snakebite, one should stay with the victim and the other should go for help. Everyone should know what to do in the event of a snakebite incident.

You should also prepare and carry an emergency snakebite kit. With the essential items in the snakebite kit, and the ability to apply them rapidly without panic or confusion, you can buy precious time and help save the life of the victim in the event of a snakebite.

EMERGENCY SNAKEBITE KIT

Snakebite kits can be prepared easily and relatively inexpensively. Start by obtaining a small canvas pouch such as those available in any army-navy surplus store. Include the following items:

- At least one roll each of 2" and 3" ACE or comparable elastic bandaging with clips.
- Several sterile 4 x 4 surgical gauze pads.

- A small bottle of betadine solution.
- One roll each of 1/2" and 1" surgical adhesive tape. (Do not use paper or clear plastic tape).
- Sawyer Extractors, or similar extractor devise. These devises are available in most camping gear, hunting/fishing or outdoors shops.

The following are general guidelines that should be adhered to in case of an individual being bitten by a venomous snake.

What NOT To Do If Bitten By A Venomous Snake:

1. DO NOT permit removal of pressure dressings or ACE bandage until the victim is at a facility ready and able to administer antivenom. As soon as the dressings are released the venom will spread causing the usual expected problems of a venomous snakebite.
2. Do not eat or drink anything unless directed by a physician.
3. Do not engage in strenuous physical activity.
4. Do not apply oral (mouth) suction to bite.
5. Do not cut into or incise bite marks with a blade.
6. Do not drink any alcohol or use any medication.
7. Do not apply either hot or cold packs.
8. Do not apply a narrow, constrictive tourniquet such as a belt, necktie or cord.
9. Do not use a stun gun or electric shock of any kind.

3.3.2 Procedures for On-Campus Snakebites

The following are minimum guidelines that should be adhered to in case of a snakebite.

- IMMEDIATELY contact UPD at ext. 2911 and have them CONTACT THE Laredo 911 system as well as Student Health if during hours of operation.
- IMMEDIATELY inform 911 operator to contact South Texas Poison Center (1-800-764-7661).
- Contact the Laboratory Director by phone as soon as possible. In the absence of the Laboratory Director contact the Department Chair. In the absence of Department Chair contact the Dean.
- Contact the family of the victim if the victim chooses
- With the help of the Laboratory Director fill out an incident report within 24 hours of the incident.

3.3.3 First Aid Treatment of Snakebites in the Field

The following are minimum guidelines that should be adhered to in case of a snakebite in the field.

1. Allow bite to bleed freely for 15-30 seconds.
2. Cleanse and rapidly disinfect area with Betadine or Alcohol pad
3. If bitten on the hand, finger, foot or toe, wrap leg/arm rapidly with Ace Bandage past the knee or elbow joint immobilizing it.
4. Leave area of fang marks open.
5. Apply Sawyer Extractor immediately until there is no more drainage from fang marks. (See specific instructions for Sawyer Extractor Kit.)
6. Cleanse and disinfect bite area again.
7. Apply hard direct pressure over bite using a 4 x 4 gauze pad folded in half.
8. Soak gauze pad in Betadine(TM) solution if available, but only if victim is not allergic to iodines.
9. Strap gauze pad tightly in place with adhesive tape.
10. Over-wrap dressing above and below bite area with additional ACE bandage.
11. Wrap ACE (elastic) bandage as tight as one would for a sprain but not too tight to cut off circulation.
12. Check for pulses above and below elastic wrap; if absent it is too tight.
13. Use splinting to immobilize bitten extremity.
14. If possible, try and keep bitten extremity below heart level or in a gravity dependent position.
15. Visual identification / description of the offending snake is necessary for medical purposes.
16. Use extractor device until there is no further drainage possible and then apply pressure dressing with gauze pad and tape.
17. Go to nearest hospital or medical facility as soon as possible.
18. IMMEDIATELY inform hospital staff to contact South Texas Poison Center (1-800-764-7661).

3.3.4 Procedures for Sawyer Extractor Kit

The Extractor pump creates a powerful suction designed to remove venom from the body by sucking it out the same cavity (fang or stinger track) through which it was injected. If necessary to improve suction, use the safety razor provided to remove body hair from the bitten area. Other techniques for improving suction include wetting or covering the surface under the suction cup with petroleum jelly or Vitamin A&D ointment to help provide a seal.

- Select suction cup size depending on area of body bitten as well as distance between multiple fang punctures. Insert the smaller end into the extractor nozzle.
- Pull the plunger out to its fullest extent and place the cup firmly over the bite or sting.
- Using the thumb, push the plunger all the way down until you feel the suction and let the pump remove the poison.
- Insect bites take up to 90 seconds of continuous application for effective removal of venom. Due to spreading factors of snake venom, suction for only the first few minutes after a snakebite is beneficial but you can continue applying vacuum for as long as possible if you are getting results (fluid removal in the cup).

- In snakebites it is recommended to use one extractor device over one fang track. For maximum efficiency two fang tracks require two extractors placed simultaneously and separately over each mark. Applying a pressure bandage above the bite marks pushes the venom toward the vacuum exerted by the extractor device. If you only have one extractor device on hand place the device over one fang track at a time and alternate between separate fang tracks every two minutes for up to 10 minutes if you are getting results.
- Pull the plunger up gently to release the vacuum. If present, venom mixed with body fluids will be visible on the skin. Wipe away carefully and avoid splatter. Disinfect bite-site with alcohol wipes or pour betadine on wounds and dress with bandages.
- Seek medical attention.

NOTICE

The spread of venom to vital organs can be life-threatening and there is no way of knowing how life-threatening a snakebite is in the first moments of the event. Many North American pit viper bites (rattlesnake, moccasin and copperhead) are myolytic and hemolytic. A significant injection of venom may reach one of the body's most important muscles - the heart.

The use of elastic bandages for containment / sequestration for a North American pit viper bite is felt by some to increase the risk of a disfiguring local tissue injury, which may necessitate skin grafts and treatment once the acute, life-threatening phase of the event has passed.

Therefore, users of this first-aid treatment method must recognize that there is a trade-off: containment as a life-saving measure at the risk of local tissue or even kidney damage, which while not necessarily life-threatening, could be disfiguring, painful and / or could require prolonged and extensive follow-up treatment.

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February 27, 1995

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September, 1997

Amended by TAMIU Department of Natural Science Lab Safety Committee in Collaboration with Kimberlee Sandoval, Safety Coordinator and
Angie Cantrell, Director of Student Health
April 10, 2002

Amended by TAMIU Office of Environmental Health and Safety
September/2017

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APPENDIX B: PROCEDURES FOR MICROBIOLOGICAL LABORATORIES

All persons using laboratories at TAMIU are bound to the safety procedures stated in the University's Chemical Hygiene Plan. This appendix deals with specific procedures pertaining to microbiology laboratories and is designed as a supplement to the Chemical Hygiene Plan. Refer to various sections within the Chemical Hygiene Plan to obtain information on safety procedures not covered in this appendix.

1.0 GENERAL SAFETY PROCEDURES

The following procedures have been established to minimize the health risks while conducting procedures in a microbiology laboratory. It is the responsibility of the laboratory supervisor/professor to demonstrate these and other appropriate aseptic procedures to ensure that all students are proficient at making proper aseptic transfers.

Every microorganism used in lab should be treated as a pathogen. Even though microbial lab organisms may be altered forms that are normally not dangerous, they can mutate into pathogenic forms, and on occasion you may work with organisms that are not lab strains.

NOTE

Any microorganism can be dangerous if given the proper conditions.

It is imperative to learn the names of instruments and other items used in microbiology, and know the proper use of each. Transferring microbial cultures from one container to another is a common practice. This requires proper "aseptic techniques" which will minimize the risk of contact with the microorganisms and reduce the risk of contaminating cultures. Proper aseptic techniques include, but are not limited to, the following:

1. Flame inoculating needles and loops properly, both before and after contact with microorganisms.
2. Keep lids on Petri dishes and caps on culture tubes when not in use. Remove lids and caps only for making transfers, and replace as soon as possible to prevent contamination.
3. When making transfers to and from glass culture tubes, flame the tops of the tubes after removing the cap, and reflame the tops before replacing the cap to prevent contamination.

4. When making transfers, keep your face away from the microbial cultures. This minimizes the risk of your own microbes contaminating the cultures, and reduces the risk of inhalation of aerosols from the cultures.
5. Use rubber bulbs or mechanical pumps to pipette fluids. Never pipette materials by mouth.
6. Never place contaminated materials (pipettes, swabs, inoculating needles, etc.) on the workbenches.
7. Microscopes are important instruments in microbiology. Individuals should become very familiar in the proper usage of this instrument, especially with the use of the various objectives (lenses). Immersion oil should only be used with specially designed oil-immersion objectives. Oil will damage the "dry" objectives. Do not use the coarse focus mechanism when observing slides with longer-length objectives. Clean the objectives before and after use to keep them free of oil and dirt.
8. Place used items in the appropriate disposal containers for sterilization. These containers should be clearly labeled with the type of waste they contain. Do not mix different waste types.
9. Do not take equipment, media, or bacterial cultures out of the laboratory.
10. Report all spills and accidents, no matter how small, to the laboratory supervisor. Spills should be covered with paper towels and drenched with disinfectant. Leave the disinfectant in contact with the spill for at least 15 minutes.
11. Wash hands before and after working in the laboratory, using antimicrobial soap.
12. Notify your instructor if you become ill during lab. If you become ill outside of class, notify your instructor before you start lab work. The instructor may decide to curtail your lab activities for that period if your condition may be worsened, or if your condition poses a danger to other students. Also, if you are pregnant or become so during the term, it is best to notify the instructor so that any necessary precautions can be taken.
13. All counter tops and surface areas must be cleaned after every experiment.
14. Personal belongings should be stored away from experiment.

2.0 SPECIFIC LAB PROCEDURES FOR LAB TECHNICIANS

The following are minimum guidelines for microbiological laboratory technicians and should be adhered to at all times.

1. Always maintain fresh stock cultures. New cultures should be inoculated into fresh media every two months. If this is not practical, existing stock cultures should be reinoculated into fresh media every two months. Screening for mutants is desirable (using replica-plating, isolation culturing, or similar techniques).
2. Prepared media should be used promptly. Freshly prepared media is best, but if the lab uses pre-made media from a supply company, be sure to use the media before the expiration date.
3. Expired media should be autoclaved and disposed.
4. Rotation of disinfectants is recommended on a weekly basis. A rotation of sodium hypochlorite solution (bleach), isopropyl alcohol (70%), and quaternary ammonium cleaner ("Quat") usually works well.

5. Students should be supplied with adequate waste containers. Suggested labels for these containers are as follows:
    - Disposable items (swabs, plastics, etc.) for autoclaving
    - Reusable items (glassware) for autoclaving
    - Reusable pipettes (a container partially filled with liquid detergent should be available for these)
    - Noncontaminated waste

APPENDIX - B - prepared by: Thomas Neil McCrary
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Amended by TAMIU Department of Natural Science Lab Safety Committee in collaboration with Kimberlee Sandoval, Safety Coordinator.
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APPENDIX C: PROCEDURES FOR WORKING WITH ZOOLOGICAL SPECIMENS

All persons using laboratories at Texas A&M International University are bound to the safety procedures stated in the University's Chemical Hygiene Plan. This appendix deals with specific procedures pertaining to zoological specimens and is designed as a supplement to the Chemical Hygiene Plan. Refer to various sections within the Chemical Hygiene Plan to obtain information on safety procedures not covered in this appendix.

1.0 PRESERVED SPECIMENS

The following are minimum guidelines for working with preserved specimens and should be adhered to at all times.

1. For specimens preserved in formalin, formaldehyde, or alcohol, contact with the chemical should be avoided. Appropriate PPE must be worn while working with preserved specimens.
2. Formalin and formaldehyde are known carcinogens. To avoid breathing vapors from the specimens, work in a fume hood when possible. Avoid contact with the specimens.
3. If the specimen can be viewed adequately within its container, avoid removing it from the container. This prevents unnecessary exposure to the preservative.
4. If the specimen is to be dissected, any organs or tissues that are removed from the organism should be retained to prevent unnecessary contamination of landfills and/or sewers. A plastic zip-lock bag is useful for this purpose. Do not wash tissues or liquid preservative down sink drains if it can be avoided.
5. When a specimen is no longer of use, it should be properly disposed. Consult with the University's Institutional Animal Care and Use Committee (IACUC) for proper procedures.
6. Clean all dissecting instruments and trays so that they are free of tissue, hair, and preservative. Dry the instruments to prevent rusting.

2.0 NON-PRESERVED SPECIMENS

The following are minimum guidelines for working with non-preserved specimens and should be adhered to at all times.

1. Specimens that are not preserved should be stored in a freezer unit (or a refrigerator if the experiment will be impaired by freezing). The specimen should be used as soon as possible to avoid spoilage.

2. Care should be taken to avoid contact with body fluids of animal specimens, as they may be contaminated with virulent bacteria, viruses, etc., or the toxins of such organisms. Gloves, safety glasses, and a protective coat should be worn. A mask also will help prevent droplet infections. Persons commonly performing necropsies on wild animals should consult a physician concerning immunization for diseases that are prevalent in the area.
3. Some animal specimens may carry vectors (such as fleas, worms, and ticks) which can transmit disease. Avoid contact with such parasites, and attempt to contain them when possible. Fleas, for example, are carriers of many harmful diseases, and will readily jump from a specimen onto your clothing. Be especially conscious of fleas and other parasites when working with animals that may carry rabies or other such diseases; parasites are also quite capable of spreading these diseases.
4. Bodily fluids of animals should be treated in the same manner as human body fluids; assume that such fluids may be contaminated with potential pathogens. If noxious vapors are also a problem, work in a fume hood. After completion of work, wash your hands thoroughly with antibacterial soap and water.
5. Be extremely careful when working with organisms which have poison glands or other potentially hazardous secretions.
6. When a specimen is no longer of use, it should be properly disposed. Consult with the University's Animal Care and Use Committee for proper procedures.
7. Disinfect all instruments after use. Wash all instruments and trays so that they are free of tissues, body fluids, and hair. Dry the instruments to prevent rusting.

3.0 LIVE SPECIMENS

It would be quite difficult to outline the proper capture, handling, and confinement techniques for each animal species under study at TAMIU. It is expected, therefore, that each researcher be familiar with the techniques pertaining to the particular animals he or she will be studying. All techniques for use in research projects must be formally approved by the University's Animal Care and Use Committee. With that in mind, these general guidelines should be followed:

1. Procedures used should minimize stress to animals and minimize risk to the researcher. Animals should be properly restrained while close-up tests are being performed (drawing blood, taking measurements, etc.).
2. Procedures which cause prolonged distress should be performed with appropriate sedation or anesthesia. This can also help to protect the researcher from bites, scratches, etc. caused by an animal in pain.
3. Animals which would experience severe or chronic stress that cannot be relieved should be euthanized after (or, if appropriate, during) the procedure.
4. Euthanasia methods should produce minimal stress for the animal. All methods of euthanasia should be consistent with those methods approved for the species you are working with.

5. Animals in captivity should be held under conditions that are appropriate for their species and contribute to their health and well-being. Special consideration should be given to such factors as hygiene, shelter, nutrition, group composition, and medical care.
6. The above guidelines should be implemented with regard to lab-reared animals as well as wild animals.

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APPENDIX D: EXAMPLES OF PEROXIDE FORMING CHEMICALS

The following is an abbreviated list which identifies chemicals that could become unstable with peroxide formations. Please identify the chemicals within your laboratory that could produce peroxide crystals. Ensure that these chemicals are used or disposed of in a timely manner.

Acetal	t-Butyl Ethyl Ether
Allyl Ether	t-Butyl Methyl Ether
Allyl Ethyl Ether	n-Butyl Phenyl Ether
iso-Amyl Benzyl Ether	n-Butyl Vinyl Ether
n-Amyl Ether	Chloroacetaldehyde Diethylacetal
p-n-Amyloxybenzoyl Chloride	2-Chlorobutanediene
Benzyl n-Butyl Ether	1-(2-Chloroethoxy)-2-phenoxyethane
Benzyl Ether	Chloromethyl Methyl Ether
Benzyl Ethyl Ether	b-Chlorophenetole
Benzyl Methyl Ether	o-Chlorophenetole
Benzyl 1-Naphthyl Ether	p-Chlorophenetole
Bis(2-n-butoxyethyl) Phthalate	Cyclohexane
1,2-Bis(2-chloroethoxy) Ethane	Cyclooctene
Bis(chloromethyl) Ether	Decalin
Bis(2-ethoxyethyl) Adipate	p-Dibenzyloxybenzene
Bis(2-ethoxyethyl) Ether	1,2-Dibenzyloxyethane
Bis(2-ethoxyethyl) Phthalate	1,2-Dichloroethyl Ethyl Ether
Bis(2-methoxyethyl) Adipate	2,4-Dichlorophenetole
Bis(2-(2-methoxyethoxy)ethyl) Ether	m-Diethoxybenzene
Bis(2-methoxyethyl) Carbonate	o-Diethoxybenzene
Bis(2-methoxyethyl) Ether	p-Diethoxybenzene
Bis(2-methoxyethyl) Phthalate	1 ,2-Diethoxyethane
Bis(2-phenoxyethyl) Ether	Diethoxymethane
2-Bromoethyl Ethyl Ether	2,2-Diethoxypropane
b-Bromophenetole	Diethyl Ether
o-Bromophenetole	Diethyl Fumarate
p-Bromophenetole	2,2-Dimethoxypropane
3-Bromopropyl Phenyl Ether	• Dioxane

• Diisopropyl Ether	Isobutyl Vinyl Ether
1,1-Dimethoxyethane	• Isophorone
1,2-Dimethoxyethane	• b-Isopropoxypropionitrile
• Dimethoxymethane	Isopropyl Ether
• 1,3-Dioxepane	3-Methoxy- 1 -butyl Acetate
2,4-Dinitrophenetole	2-Methoxyethyl Acetate
• Di-n-propoxymethane	b-Methoxypropionitrile
1,2-Epoxy-3-phenoxy-propane	Methyl p-n-Amyloxybenzoate
• 1,2-Epoxy-3-isopropoxy-propane	n-Methylphenetole
p-Ethoxyacetophenone	m-Nitrophenetole
(2-Ethoxyethoxy)ethyl Acetate	Oxybis(2-ethyl acetate)
2-Ethoxyethyl Acetate	Oxybis(2-ethyl benzoate)
2-Ethoxyethyl o-Benzoylbenzoate	b-b-Oxydipropionitrile
1 -Ethoxynaph thalene	a-Phenoxypropionyl Chloride
o-Ethoxyphenyl Isocyanate	p-Phenylphenetole
p-Ethoxyphenyl Isocyanate	Phenyl o-Propyl Ether
3-Ethoxypropionitrile	n-Propyl Ether
Ethyl Ether	• n-Propyl Isopropyl Ether
Ethyl b-Ethoxypropionate	• Tetrahydrofuran
Ethyl Vinyl Ether	• Tetralin
o-lodophenetole	Triethylene Glycol Diacetate
p-Iodophenetole	Triethylene Glycol Dipropionate
Isoamyl Benzyl Ether	• 1,3,3-Trimethoxypropene
Isoamyl Ether	• Vinylidene Chloride

- Denotes those chemicals which form peroxides easily.

APPENDIX E: CHEMICAL HYGIEN PLAN SUMMARY

The Environmental, Health & Safety Office has compiled this safety summary in conjunction with the Chemical Hygiene Plan (CHP). All individuals involved with laboratory activities involving hazardous materials should familiarize themselves with the complete CHP and use this summary only as a quick reference guide.

1.0 GENERAL

- Do not eat, drink, use tobacco products or apply cosmetics in the lab.
- Wash hands thoroughly after handling laboratory chemicals.
- Do not leave Bunsen burners or other heat sources unattended.
- Use approved containers for heating chemicals.
- Use correct heating techniques.
- Learn the locations of fire extinguishers, fire blanket, eyewash, emergency showers and first aide kits.
- Do not work alone while conducting experiments in the laboratory without pre-authorization.
- Use correct techniques when inserting glass tubing into rubber stoppers.
- Secure gas cylinders and replace the cap when regulator is not in place.
- Perform all procedures in a manner that prevents the production of aerosols.
- Always practice "good housekeeping" techniques in your work area (e.g. clean spills immediately, wipe down bench top at end of day).
- NEVER pipette by mouth - use a pipette bulb.

2.0 HAZARD COMMUNICATION PROGRAM (HAZCOM)

- Employees must receive training in the University's HazCom Program.
- SDS's must be readily accessible for chemicals used in labs.
- Students must be informed of hazards associated with chemicals used in lab.

3.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

- Wear the required PPE when conducting laboratory work.
- Wear appropriate shoes while conducting laboratory work.
- Use a properly functioning fume hood when working with toxic or volatile chemicals.
- Do not store or place items on, or around, emergency safety equipment.

4.0 CHEMICAL STORAGE / LABELS / DISPOSAL

- Label secondary containers with the proper chemical information.
- Do not use chemicals from an unlabeled container.
- Store all flammable chemicals in approved storage cabinets.
- Do not store incompatible chemicals together.
- Return lab chemicals and equipment to a proper storage location; do not store items on bench top.
- Use a rubber safety bucket to transport liquid and/or hazardous chemicals.
- Dispose of chemical waste and contaminated laboratory items as directed by the laboratory supervisor.

5.0 EMERGENCY PROCEDURES

- Upon personal contamination by a hazardous chemical, immediately remove contaminated clothing and flush affected areas with copious amount of water.
- Report all chemical exposures, or chemical spills to the Laboratory Supervisor.
- Seek medical attention if necessary.
- Notify UPD in the event of fire or injury.

NOTICE

Unauthorized experiments are absolutely prohibited! Experiments can only be authorized by the professor or laboratory supervisor teaching the course. Horseplay, pranks and other acts of mischief are dangerous and absolutely prohibited. Such acts could lead to disciplinary actions in accordance with the Student Handbook.

APPENDIX F: NON-SCHEDULED LABORATORY USE PERMIT

NON-SCHEDULED LABORATORY USE PERMIT

The following individuals are allowed to work in the area identified in this permit.

Lab Experiment: _____

Name	Building	Room No.	Time From	Time Until

I am aware of the procedures that will be conducted under this permit. The procedures that will be performed are within the skills and abilities of the students performing the work.

I have ensured that emergency safety equipment is available and in working condition and all applicable Material Safety Data Sheets are available.

_____ _____ _____

Signature Title Ext.

This permit was issued on _____ and expires on _____

In accordance with the TAMIU Chemical Hygiene Plan, undergraduate students must possess a completed permit prior to conducting laboratory work during non-scheduled hours.

Original: Stays in the lab Send Copies to: Instructor, Chair, and UPD.

APPENDIX G: EXAMPLES OF NFPA 704 AND HMIS LABELS

EXAMPLE OF NFPA 704 LABEL	EXAMPLE OF HMIS LABEL

NUMBERING SYSTEM INFORMATION

HEALTH HAZARD	FLAMMABILITY	REACTIVITY	SPECIAL
4 - Materials which on very short exposure could cause death or major residual injury even though prompt medical treatment were given.	4 - Materials which will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature, and which will burn. FLASH POINT< 73	4 - Materials which are readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures.	Specific chemical hazards will be noted in this section. Specific hazards and their symbols are as follows:
3 – Materials which short exposure cause serious temporary or residual injury even though prompt treatment were given.	3 - Liquids and solids that can be under almost all ambient temperature conditions. FLASH POINT< 100	3 -Materials that can detonate or explode but require a initiating source, or must be heated under confinement before initiation, or explosively water.	**OX** - Oxidizer ACID – Acid ALK - Alkali COR- Corrosive -W- No Water Radioactive

2 –Materials which intense exposure could cause possible injury unless prompt medical treatment is given.	2 -Materials that must be moderately heated or exposed to relatively high ambient temperatures before igniting. FLASH POINT > 100 < 200	2 -Materials that are normally unstable and readily undergo violent changes but do detonate; also materials that may react violently with water.	
1 –Materials which on exposure would cause irritation but only minor residual injury even if no treatment is given.	1 -Materials that must be preheated ignition can occur. FLASH POINT > 200	1 -Materials that are normally stable, but can become unstable at high temp. and pressures, or may react with water with some release of energy.	
0 –Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustibles.	0 -Materials that will not burn.	0 -Materials that are normally stable even under fire explosive conditions, and that are not reactive with water.	