The University of Louisiana at Monroe

Chemical Hygiene Program

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THE University of Louisiana at Monroe

Chemical Hygiene Plan

1. Introduction

The University of Louisiana at Monroe continually strives to provide a learning, teaching, and research environment free from recognized hazards. Pursuant to Occupational Safety and Health Administration Regulations (29 CFR 1910.1450) the University establishes this Chemical Hygiene Plan (CHP) to protect employees and students from the potential health hazards associated with the handling, use, and storage of hazardous chemicals.

2. Scope

The Chemical Hygiene Plan applies to all facilities at the University of Louisiana at Monroe. The safe storage, use, and disposal of chemicals require policies for the protection of students, employees, and the environment. Chemicals, which include reagent grade materials through trade name products and wastes, are the focus of increased regulatory actions by federal, state, and local governments. The purpose of this Chemical Hygiene Plan is to provide the chemical user with basic safety information regarding the use of chemicals. This Chemical Hygiene Plans forms the foundation of the safe use of. The Chemical Hygiene Plan is an adjunct to the University of Louisiana at Monroe Hazard Communication Program.

This manual is not intended as an encyclopedia of chemicals and their hazards; it will not contain listings of hundreds of chemicals that employees/ students may encounter while working in research and development. Although numerous chemicals may be mentioned for the most part they will serve as illustrations for broad categories of hazards, except in the case of chemical incompatibility charts or listings.

Radiation Safety

The safe use and development of radioactive materials require control measures similar to those found in chemical safety. However, the use of radioactive materials has additional requirements. See the University of Louisiana at Monroe Radiation Safety Program.

3. General Principles for Working with Chemicals

a. Minimize all chemical exposures. Because few chemicals are without hazards, general precautions for handling all chemicals shall be adopted, rather than specific guidelines for particular chemicals. Skin contact with chemicals shall be avoided (as a cardinal rule).

b. Avoid underestimation of risk. Even for substances of no known significant hazard, exposure shall be minimized; for work with substances which present special hazards, special precautions shall be taken. One shall assume that any mixture will be more toxic than its most toxic component and that all substances of unknown toxicity are toxic.

c. Ensure adequate ventilation. The best way to prevent exposure to airborne substances is to prevent their escape into the working atmosphere by use of fume hoods and other ventilation devices. All facility fume hoods certifications will be maintained by the Environmental Health & Safety Office. This will include but is not limited to mechanical components such as motors, belts, sashes, and cables. It will also include air flow calibration.

d. Institute the chemical hygiene program. A mandatory chemical hygiene program designed to minimize exposures is needed; it shall be a regular, continuing effort, not merely a standby or short-term activity. Its recommendations shall be followed in academic teaching facilities as well as by full-time facility workers.

e. Observe the PELs, TLVs. The Permissible Exposure Limits of OSHA and the Threshold Limit Values of the American Conference of Governmental Industrial Hygienists shall not be exceeded.

4. General Program Management

The responsibility for implementing the procedures outlined in this CHP is shared among ULM management, Department Heads, Chemical Hygiene Officers (CHOs), staff and students.

a. The Environmental, Health, and Safety Office is responsible for providing guidance for these and other procedures as they pertain to chemical hygiene.

b. Deans and/or department chairpersons are responsible for maintaining safe operations in their s on a daily basis. Specific responsibilities include:
   i. Ensure that the requirements of the Chemical Hygiene Plan are followed in their areas.
   ii. Assure that adequate safety resources are available to personnel.
   iii. Department Heads in charge of programs requiring use of facilities must appoint Chemical Hygiene Officers (CHO). Departments with a large number of facilities may need to select more than one CHO.

c. The Chemical Hygiene Officer will:
   i. Ensure that all phases of the CHP are implemented
   ii. Develop facility procedures that explain specific operations and procedures in designated facility areas.
   iii. Provide job and new exposure training to facility personnel and students. All training shall be documented.
   iv. Select and implement facility practices and engineering controls that reduce potential exposures.
   v. Approve procedures for work involving chemicals such as carcinogens, reproductive toxins, radioactive materials and substances containing a high degree of acute toxicity.
   vi. Conduct periodic (at least monthly) inspections of hazardous materials operations being performed in the facility to ensure compliance with the CHP and other applicable guidelines and ensure hazardous wastes (HW) are handled and disposed in the required manner, safe-guards and PPE are being used where

required, emergency procedures are posted and to see that emergency showers/eyewashes are being tested weekly. This inspection shall be documented on the Monthly Facility Inspection Form.

vii. Consult with the Safety Office for assistance in areas which require special attention such as HW disposal and cleanup of hazardous materials (HM) spills.

viii. Arrange for medical attention and report chemical-related injuries and overexposure to the Safety Office.

ix. Review procurement requests to ensure that HM purchases do not exceed specific needs and storage capabilities and check for use of less-hazardous substitutes. Procurement requests will be checked against present inventory to prevent making purchases of HM which is already available. Check new orders and inventory to ensure that material safety data sheets (MSDSs) are available for the chemical.

x. Arrange for the inventory and examination of stored chemicals at least annually for replacement, deterioration, and container integrity. **A list of all chemicals used must be submitted by all facilities to the Environmental Health and Safety Office. This list shall be submitted by October 1, annually.**

d. Supervisors/Instructors are responsible for planning and conducting operations in accordance with the CHP and the following:

i. Ensure that all participants are aware of all emergency procedures and the proper use of safe-guards.

ii. Require proper use and maintenance of personal protective equipment.

iii. Set up a schedule for testing of emergency showers/eyewashes and properly record the results.

iv. Ensure that all persons involved in operations where hazardous chemicals are used are trained in accordance with the SOP or SDS for each specific HM.

v. Report chemical spills beyond in-house control and possible overexposure to the CHO.

vi. Monitor the amounts of HM being used to determine if more than a one-day supply is available.

e. Workers and Students responsibilities include the following:

i. Follow ULM's chemical hygiene procedures and all safety and health standards.

ii. Keep informed about the chemicals used in your area.

1. How to Prepare a Chemical Hygiene Plan

Components of the CHPs may include designation of responsible personnel, standard operating procedures (SOPs), criteria for implementation of control measures, means to ensure proper operation of engineering controls, provisions for training, information dissemination and identification of those particularly hazardous substances.

a. Standard Operating Procedures

These SOP's define the minimum use and handling procedures permitted at the University. Adherence to the SOP's by all workers is mandatory. It is the responsibility of the Chemical Hygiene Officer of each department to review the SOP's and assure that the protective equipment and procedures outlined are in place. Standard Operating Procedures for common chemical classes are located in Section 21.

b. Documentation Requirements
The Chemical Hygiene Officer must complete and sign the Chemical Hygiene Work Plan for their area after reviewing all the items outlined in the Standard Operating Procedures applicable to the facility. The completed document must be posted in the facility by October 1 of every year; when research conditions change; or when new research is initiated.

c. Training Requirements
Chemical Hygiene Officers shall assure that all workers are provided with the information and training to ensure that they are apprised of the hazards of chemicals present in their work area.

6. Basic Rules and Procedures for Working with Chemicals

a. General Rules are fundamental safety precautions which shall be familiar to all users. These practices shall be followed at all times.

i. Accidents and Spills

(1) Eye Contact: Promptly flush eyes with water for a prolonged period (at least 15 minutes) and seek medical attention.
(2) Ingestion: Consult SDS.
(3) Skin Contact: Consult SDS.
(4) Clean-up: Promptly clean up spill, using appropriate protective apparel and equipment and proper disposal.
(5) All significant accidents shall be carefully analyzed with the assistance of the Safety Officer and the results distributed to those who might benefit.

ii. Avoidance of "routine" exposure. Each employee with the training, education and resources provided by supervision, shall develop and implement work habits consistent with this Chemical Hygiene Plan to minimize personal and co-worker exposure to the chemicals in the facility. Based on the realization that all chemicals inherently present hazards in certain conditions, exposure to all chemicals shall be minimized. General precautions which shall be followed for the handling and use of all chemicals include:

(1) Develop and encourage safe habits.
(2) Avoid unnecessary exposure to chemicals by any route.
(3) All employees shall wash all areas of exposed skin prior to leaving the facility.
(4) Vent apparatus (vacuum pumps, distillation columns, etc.) which may discharge toxic chemicals into local exhaust devices.
(5) Inspect gloves and test glove boxes before use.

(6) Do not allow release of toxic substances in cold rooms and warm rooms, since these have contained, re-circulated atmospheres.
(7) Mouth suction for pipetting or starting a siphon is prohibited.
(8) Use only those chemicals for which the quality of the available ventilation system is appropriate.
(9) Do not smell or taste chemicals.
(10) Avoid eating, drinking, smoking, gum chewing or application of cosmetics in areas where facility chemicals are present; wash hands before conducting these activities. Avoid storage, handling or consumption of food or beverages in storage areas, and refrigerators.
(11) Glassware or utensils used for facility operations shall not be used for food or drink consumption or preparation.

iii. Laboratory Equipment and Glassware. Each employee shall keep the work area clean and uncluttered. At the end of each work day or operation, the work area shall be thoroughly cleaned and all equipment properly cleaned and stored.
(1) All laboratory equipment shall be used only for its intended purpose.
(2) Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware. All broken glassware will be immediately disposed of in an appropriately labeled broken glass container constructed with corrugated cardboard or other puncture-resistance material.
(3) Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments shall implosion occur.
(4) All laboratory equipment shall be inspected by the user on a periodic basis for safety defects, and replaced or repaired as necessary.

iv. Personal Protection – Apparel
(1) Safety glasses are required and will be worn at all times for employees and visitors in the facility where HM are being used.
(2) Chemical goggles and a full face shield (if necessary) shall be worn during chemical transfer and handling operations as procedures dictate.
(3) Avoid the use of contact lenses in the facility unless necessary; if they are used, inform the supervisor so special precautions can be taken.
(4) Sandals, open toe shoes, and bare feet are strictly prohibited in the facility where HM are being used. Close toe shoes are required at all times.
(5) Coats/Aprons provide adequate body protection for most operations in the facility where HM are being used.

Coats/Aprons will be laundered on a periodic basis (at least monthly). Coats/Aprons shall be removed immediately upon discovery of significant contamination.

(6) Use appropriate gloves when the potential for contact with toxic materials exists. The degradation and permeation characteristics of the glove material selected must be appropriate for protection from the hazardous chemical being handled. Gloves shall be inspected and washed prior to reuse. If a chemical permeates the glove, it shall be immediately replaced, as prolonged contact with the hand may cause more serious damage than in the absence of a proper glove. Gloves shall be washed before removal from the hands.

(7) Thermal-resistant gloves shall be worn for operations involving the handling of heated materials and cryogenic fluids. Thermal-resistant gloves shall be non-asbestos and shall be replaced when damaged or deteriorated.

(8) Appropriate respiratory equipment shall be used when air contaminant concentrations are not sufficiently restricted by engineering controls. Respirators shall be inspected before each use. If it is of the kind that uses cartridges, these will also need inspection prior to use and cartridge replacement in a timely manner.

(9) Use any other protective and emergency apparel as appropriate.

v. Personal Protection – Equipment

(1) Spill control kits shall be on hand to clean up small spills.

(2) Safety shields shall be used where applicable for protection against explosion and splash hazards.

(3) Fire extinguishers must be available in all facilities and all personnel shall be trained in their use.

(4) Drench type eyewash fountains/safety showers must be available in the facilities to provide a continuous stream of water.

(5) Eyewash fountains/safety showers are to be available in all facilities where chemicals are handled.

(6) Every facility worker shall know where the eyewash fountains/safety showers are located and be trained in their use.

vi. Personal Work Practices

(1) All employees shall be alert for unsafe practice and conditions in the facility and shall immediately report such practices and/or conditions to the facility supervisor. The supervisor must correct unsafe practices and/or conditions promptly.

(2) Long hair and loose-fitting clothing shall be confined close to the body.

(3) Do not wear shorts or nylon hose.
(4) Do not block the aisles or doors with chairs, stools, book bags, etc.
(5) Avoid working alone in the facility. When working alone in the facility arrange for periodic checks by personnel in adjacent facilities.
(6) Avoid practical jokes or other behavior which might confuse, startle, or distract another worker.
(7) Use only those chemicals appropriate for the ventilation system.
(8) Avoid unnecessary exposure to all chemicals by any route.
(9) Do not smell or taste any chemicals.
(10) Wash areas of exposed skin well before leaving the facility.
(11) Keep work area clean and uncluttered, with chemicals and equipment being properly stored. Clean up the work area on completion of an operation or at the end of each day.
(12) Planning: Seek information and advice about hazards, plan appropriate protective procedures and plan positioning of equipment before beginning any new operation.
(13) Use of hood: Use the hood for operations which might result in release of toxic chemical vapors or dust.

b. Chemical labeling
   i. Primary chemical containers shall be appropriately marked with a durable and informative GHS label.
   ii. Primary chemical container labels shall identify the chemical's source and any indication of hazard due to exposure.
   iii. Secondary chemical containers shall be labeled by the individual using the container.
   iv. Existing labels on chemicals shall not be removed or defaced unless another appropriate GHS label is immediately attached.

c. Working with Allergens and Embryotoxins
   i. Allergens (examples: diazomethane, isocyanates, bichromates): Wear suitable gloves to prevent hand contact with allergens or substances of unknown allergenic activity.
   ii. Embryotoxins (examples: organomercurial, lead compounds, formamide): Women of childbearing age shall handle these substances only in a hood whose satisfactory performance has been confirmed, using appropriate protective apparel (especially gloves) to prevent skin contact.
   iii. Review each use of these materials with the research supervisor and review continuing uses annually or whenever a procedural change is made.
   iv. Store these substances, properly labeled, in an adequately ventilated area in an unbreakable secondary container.
   v. Notify supervisors of all incidents of exposure or spills; consult a qualified physician when appropriate.

d. Special Procedures for Highly Hazardous Substances

Special precautions shall be taken when performing work with any or the following chemical categories: carcinogens, reproductive toxins, substances that have a high degree of acute toxicity, or chemicals whose toxic properties are unknown.

i. Chemical Categories
   (1) Carcinogens- Both known and suspect cancer-causing chemicals reported in the latest edition of the National Toxicology Program's "Carcinogens Summary".
   (2) Reproductive Toxins – Chemicals including mutagens and teratogens identified as such by the MSDS.
   (3) Acute Toxicity Chemicals – Any substances for which the LD50 data described in the applicable MSDS (or other literature source) cause the substance to be classified as a level 3 or 4 health hazard according to the HMIS system.
   (4) Chemicals Whose Toxic Properties are Unknown– Chemicals for which there is no known statistically significant study conducted in accordance with established scientific principle that establishes its toxicity.

ii. Precautions for Use
   (1) Allow only those persons specifically trained to work with highly hazardous chemicals to work with those chemicals.
   (2) Designated Area – A hood, glove box, portion of a facility, or an entire facility must be designated for high hazard use.
   (3) Designated areas shall be posted and their boundaries clearly marked. Posting shall include the identification of the highly hazardous chemicals used in the area.
   (4) Access to the facility shall be restricted during high hazard chemical use by the facility supervisor.
   (5) Suitable gloves and long sleeves shall be worn during use of high hazardous chemicals.
   (6) Use the smallest amount of chemical that is consistent with the requirements of the work to be done.
   (7) Use high-efficiency particulate air (HEPA) filters or high efficiency scrubber systems to protect vacuum lines and pumps as appropriate.
   (8) Decontaminate a designated area when work is completed.

e. Work with Chemicals of Moderate Chronic or High Acute Toxicity
   i. Aim: To minimize exposure to these toxic substances by any route using all reasonable precautions.
   ii. Applicability: These precautions are appropriate for substances with moderate chronic or high acute toxicity used in significant quantities.
   iii. Location: Use and store these substances only in areas of restricted access with special warning signs. Always use a hood previously evaluated to confirm adequate performance with a face velocity of at least 80-85 linear feet per minute or other containment device for procedures which may result in the generation of aerosols or vapors containing the

substance; trap release vapors to prevent their discharge with the hood exhaust.

iv. Personal protection: Always avoid skin contact by use of gloves and long sleeves (and other protective appropriate apparel). Always wash hands and arms immediately after working with these materials.

v. Records: Maintain records of the amounts of these materials on hand, amounts used and the names of the workers.

vi. Prevention of spills and accidents: Be prepared for accidents and spills. Assure that at least two people are present at all times if a compound in use is highly toxic or of unknown toxicity. Store breakable containers of these substances in chemically resistant trays; also work and mount apparatus above such trays or cover work and storage surfaces with removable, absorbent, plastic backed paper. If a major spill occurs outside the hood, according to the substance involved, it may be necessary to evacuate the area; assure the cleanup personnel wear suitable protective apparel and equipment. The facility supervisor must assess the situation and take action accordingly.

vii. Waste: Thoroughly decontaminate or incinerate contaminated clothing or shoes. If possible, chemically decontaminate by chemical conversion. Store contaminated waste in closed, suitably labeled, impervious container (for liquids, in glass or plastic bottles half-filled with vermiculite).

f. Work with Chemicals of High Chronic Toxicity

i. Access: Conduct all transfers and work with these substances in a "controlled area": a restricted access hood, glove box, or portion of a lab, designated for use of highly toxic substances, for which all people with access are aware of the substances being used and necessary precautions.

ii. Approvals: Plans for use and disposal of these materials must be approved by the facility supervisor.

iii. Non-contamination Decontamination: Protect vacuum pumps against contamination by scrubbers or HEPA filters and vent them into the hood. Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the hood before removing them from the controlled area. Decontaminate the controlled area before normal work is resumed there.

iv. Exiting: On leaving a controlled area, remove any protective apparel (placing it in an appropriate, labeled container) and thoroughly wash hands, forearms, face and neck.

v. Housekeeping: Use a wet mop or a vacuum cleaner equipped with a HEPA filter instead of dry sweeping if the toxic substance was a dry powder.

vi. Medical Surveillance: If using toxicologically significant quantities of such a substance on a regular basis (e.g., three times per week), consult a qualified physician concerning desirability of regular medical surveillance.

vii. Records: Keep accurate records of the amounts of these substances stored and used, the dates and names of users.
viii. Signs and labels: Assure that the controlled area is conspicuously marked with warning and restricted access signs and that all containers of these substances are appropriately labeled with identity and warning labels.
ix. Spills: Assure that contingency plans, equipment, and materials to minimize exposures of people and property in case of accident are available.
x. Storage: Store containers of these chemicals only in a ventilated, limited access area in appropriately labeled, unbreakable, chemically resistant, secondary containers.
xi. Glove boxes: For a negative pressure glove box, ventilation rate must be at least two volume changes per hour and pressure at least 0.5 inches of water. For a positive pressure glove box, thoroughly check for leaks before each use. In either case, trap the exit gases or filter them through a HEPA filter and then release them into the hood as appropriate.
xii. Waste: Use chemical decontamination whenever possible; ensure that containers of contaminated waste (including washings from contaminated flasks) are transferred from the controlled area in a secondary container under the supervision of authorized personnel.

g. Animal Work with Chemicals of High Chronic Toxicity
i. Access: For large scale studies, special facilities with restricted access are preferable.
ii. Administration of the toxic substance: When possible, administer the substance by injection or gavage instead of in the diet. If administration is in the diet, use a caging system under negative pressure or under laminar air flow directed toward HEPA filters.
iii. Aerosol suppression: Devise procedures which minimize formation and dispersal of contaminated aerosols, including those from food, urine and feces (e.g., use HEPA filtered vacuum equipment for cleaning, moisten contaminated bedding before removal from the cage, mix diets in closed containers in a hood).
iv. Personal protection: When working in the animal room, wear plastic or rubber gloves, fully buttoned facility coat or jump suit and, if needed because of incomplete suppression of aerosols, other apparel and equipment (shoe and head coverings, respirator).
v. Waste disposal: Dispose of contaminated animal tissues and excreta by incineration if the available incinerator can convert the contaminant to non-toxic products; otherwise, package the waste appropriately for burial in an EPA-approved site.

h. Prior Approval for Facility Activities
Certain activities that present specific, foreseeable hazards for facilities and their users may require prior approval from their department. These activities include work with recombinant DNA, and infectious agents, sole

occupancy of building, hazardous operations, use of new procedures or chemicals, and unattended operations.

i. Sole Occupancy of Building. Under normal circumstances, work shall not be done in the facility when the only person in the building is the facility person performing the work. If this is necessary, periodic checks on that person shall be made by personnel in adjacent buildings.

ii. Hazardous Operations. All hazardous operations are to be performed during a time when at least two people are present at the facility. At no time shall a facility person, while working alone in the facility, perform work which is considered hazardous. The determination of hazardous operations shall be made by the facility supervisor.

iii. New Procedures or Chemicals. Prior to the use of new procedures or chemicals, a review of potential hazards created must be undertaken within the department or research group. Such a review shall also be completed when there is a substantial change in the amount of chemicals used or a change in the equipment used in the procedure.

iv. Unattended Operations. When facility operations are performed which will be unattended by facility personnel (continuous operations, overnight reactions, etc.), the following procedures will be employed:

(1) The facility supervisor will review work procedures to ensure the safe completion of the operation.

(2) An appropriate sign will be posted at all entrances to the facility. Another sign will be posted within the hood or work area to indicate the exact location of the unattended operation.

(3) The overhead lights in the facility will be left on.

(4) Precautions shall be made for the interruption of utility services during the unattended operation (loss of water pressure, labelectricity, etc.).

(5) Containment will be provided in the event of unexpected hazardous material releases.

(6) Tubing for running water must be in good condition and secured at connections by clamps or wire.

7. Chemical Procurement, Distribution, and Storage

a. Procurement.

i. Before a substance is received, information on proper handling, storage, and disposal shall be known to those who will be involved.

ii. No container shall be accepted without an adequate identifying label.

iii. Preferably, all substances shall be received in a central location.

b. Stockrooms/storerooms.

i. Toxic substances shall be segregated in a well-identified area with local exhaust ventilation.

ii. Chemicals which are highly toxic or other chemical containers that have been opened shall be in unbreakable secondary containers.
iii. Stored chemicals shall be examined periodically (at lease annually) for replacement, deterioration and container integrity.
iv. Stockrooms/storerooms shall not be used as preparation or repackaging areas, shall be open during normal working hours, and shall be controlled by one person.
v. Storage
(1) Storage areas for chemicals shall be well illuminated to provide easier identification.
(2) Large bottles or containers of chemicals weighing more than 5 pounds shall not be stored more than two feet from the ground.
(3) Chemicals shall be stored according to their hazard classification and compatibility.
(4) Whenever, possible acids shall be stored in a separate cabinet from other chemicals.
(5) Bases, especially strong bases, shall be stored in glass containers with a plastic or Teflon lid to avoid glass fusion.
(6) Light-sensitive chemicals shall be stored in amber glass bottles to minimize the infiltration of ultraviolet light.
(7) Liquid chemicals shall not be stored next to dry chemicals.
(8) Do not store liquids above eye level.

c. Distribution.
i. When chemicals are hand carried, the container shall be placed in an outside container or bucket.
ii. Freight labelevators shall be used, if possible.
iii. Carts used for chemical transport must have sides, on each shelf, that are high enough to retain the containers. Cart wheels must be large enough to prevent the carts from being caught in floor cracks and door and labelevator thresholds.
iv. Person transporting chemicals must wear the appropriate personal protective equipment.

d. Facility storage.
i. Amounts permitted shall be as small as practical.
ii. Do not store chemicals on bench tops or in fume hoods.
iii. Exposure to heat or direct sunlight shall be avoided.
iv. Periodic inventories shall be conducted, with unneeded items being discarded or returned to the storeroom/stockroom.
v. All labels shall face front.

8. Environmental Monitoring
Regular instrumental monitoring of airborne concentrations is not usually justified or practical in facilities but may be appropriate when testing or redesigning hoods or other ventilation devices or when a highly toxic substance is stored or used regularly.

9. Housekeeping, Maintenance, and Inspection

Each facility worker is directly responsible for the cleanliness of his or her work space, and jointly responsible for common areas of the facility. Facility management shall insist on the maintenance of housekeeping standards. The following procedures apply to housekeeping standards of the facility:

a. Cleaning.
   i. Floors shall be cleaned regularly.
   ii. The work area shall be cleaned at the end of each operation or each day.
   iii. All apparatus shall be thoroughly cleaned and returned to storage upon completion of usage.
   iv. Chemical containers shall be clean, properly labeled and returned to storage upon completion of usage.

b. Inspection.
   i. Formal housekeeping and chemical hygiene inspection shall be held monthly. See Monthly Facility Inspection Form Instructions and Form.
   ii. Department Heads, Chemical Hygiene Officers, and facility staff shall continually conduct informal housekeeping and chemical hygiene inspections.

c. Maintenance.
   i. Eye wash fountains shall be inspected and flushed for 3 minutes weekly by facility workers. The inspection shall be documented on the Emergency Eyewash/Shower Weekly Testing Schedule.
   ii. Safety showers shall be tested weekly. The inspection shall be documented on the Emergency Eyewash/Shower Weekly Testing Schedule.
   iii. Respirators for routine use shall be inspected monthly by the facility supervisor.
   iv. Other safety equipment shall be inspected regularly.
   v. Procedures to prevent restarting of out-of-service equipment shall be established.

d. Passageways.
   i. Stairways and hallways shall not be used as storage areas.
   ii. The work benches shall be kept clear of equipment and chemicals except those necessary for the work currently being performed.
   iii. All floors, aisles, exits, fire extinguishing equipment, eye washes, labelectrical disconnects, and other emergency equipment shall remain unobstructed.

10. Requirements covering Testing of Emergency Eyewash/Showers
   a. In accordance with federal OSHA and state standards, all facilities required to have emergency eyewash/showers must perform weekly tests to labeliminate the backup of particles or impurities which could contaminate wounds or the eyes such flushing becomes necessary.
   b. The requirement of ANSI Standard Z358.1, and adapted by OSHA and the Louisiana Office of Risk Management for use by all state agencies, is a mandatory requirement and each unit must be in compliance. A record of each test must be recorded and retained for at least three years.

c. Recommend each instructor whose classroom or lab has such a unit have a student conduct the tests during the first class period on the first day of the week. Persons conducting weekly tests shall sign the record sheet.
d. Testing procedures require the unit to be turned on for at least three (3) minutes and the person performing the test fill in the date and sign the attached record sheet. Copies of the form may be made from the original form for each unit. Special curtain-type covers for showers are available from safety suppliers.
e. The aforementioned test records will be acknowledged as part of the regular safety inspection conducted periodically by the safety office.

11. Medical Program
    a. Compliance with regulations.
    Regular medical surveillance shall be established to the extent required by regulations.
    b. Routine surveillance. Anyone whose work involves regular and frequent handling of toxicologically significant quantities of a chemical shall consult a qualified physician to determine on an individual basis whether a regular schedule of medical surveillance is desirable.
    c. First aid.
        i. Only personnel trained in first aid shall administer first aid.
        ii. When it is noted that no one trained as a first aid provider is available, in case of injury, the University Police will be notified on extension 5350 and apprised of the situation.
        iii. If necessary, University Police will arrange emergency transportation for the injured.
        iv. If the person is ambulatory and the injury considered non-serious, the person will be taken to the Student Health Center for first aid.

12. Records
    a. Accident records shall be completed and retained.
    b. Chemical Hygiene Plan records shall document that the facilities and precautions were compatible with current knowledge and regulation.
    c. Inventory and usage records for high-risk substances shall be kept
    d. Medical records shall be retained by ULM in accordance with the requirements of state and federal regulations.

13. Signs and labels
    Prominent signs and labels of the following types shall be posted:
    a. Emergency telephone numbers of emergency personnel facilities, supervisors and facility workers.
    b. Identity labels, showing contents of containers (including waste receptacles) and associated hazards. See Hazardous Waste label.
    c. Location signs for safety showers, eyewash stations, other safety and first aid equipment, exits and areas where food and beverage consumption and storage are permitted or are not permitted.
    d. Warnings at area or equipment where special or unusual hazards exist.

14. Spills and Accidents

a. A written emergency spill and accident plan shall be established and communicated to all personnel. It shall include procedures for ventilation failure, evacuation, medical care, reporting and drills.
b. There shall be an alarm system to alert people in all parts of the facility including isolation areas such as cold rooms.
c. A spill control policy shall be developed and shall include means of prevention, containment, cleanup and reporting.
d. All accidents or near accidents shall be carefully analyzed with the results distributed to all who might benefit.

15. Information and Training Program
a. Aim: To assure that all individuals at risk are adequately informed about the work in the facility, its risks and what to do if an accident occurs.
b. Emergency and Personal Protection Training: Every facility worker shall know the location and proper use of all available protective apparel and equipment. Full-time personnel of the facility shall be trained in the proper use of emergency equipment and procedures.
c. Receiving and stockroom store room personnel shall know about hazards, handling equipment, protective apparel and relevant regulation.
d. Frequency of Training: The training and education program shall be a regular, continuing activity-not simply an annual presentation.
e. Literature Consultation: Literature and consulting advice concerning chemical hygiene shall be readily available to facility personnel who shall be encouraged to use these information resources.

16. Waste Disposal Program
a. Aim: To assure that minimal harm to people, other organisms and the environment will result from the disposal of waste facility chemicals.
b. Content: The waste disposal program shall specify how waste is to be collected, segregated, stored and transported and include consideration of what materials can be incinerated. Transport from the institution must be in accordance with DOT regulations.
c. Discarding Chemical Stocks: Unlabeled containers of chemicals and solutions shall undergo prompt disposal; if partially used, they shall not be opened. Before a worker's employment in the facility ends, chemicals for which the person was responsible shall be discarded or returned to storage.
d. Frequency of Disposal: Waste shall be removed from facilities to a central waste storage area at regular intervals. Waste chemicals must not be placed or left for removal in hallways. Hazardous material waste pickups shall be coordinated by the Environmental Health and Safety Office.
e. Method of Disposal: Waste will be put in containers and put in a secure area. The Environmental, Health, and Safety Officer will be notified in writing to have the waste removed and disposed of by a commercial contractor. See Hazardous Request Disposal Form. Indiscriminate disposal by pouring waste chemicals down the drain or adding them to mixed refuse for landfill burial is unacceptable. Hoods shall not be used as a means of disposal for volatile chemicals. Disposal by recycling or chemical decontamination shall be used when possible.

17. Waste Chemical Compatibility Chart

Group 1-A	**Group 1-B**
Alkaline Liquids	Acid Liquids

Potential consequences: Heat generation, violent reaction.

Group 2-A	**Group 2-B**
Aluminum	Wastes in Group 1-A or 1-B
Beryllium	
Calcium	
Magnesium	
Sodium	
Other reactive metals and metal hydrides	

Potential consequences: Fire or explosion, generation of flammable hydrogen gas.

Group 3-A	**Group 3-B**
Alcohols	Concentrated waste in Groups 1-A or 1-B
Water	Calcium
	Lithium
	Metal hydrides
	Potassium
	SO2Cl2, SOCl2, PCl3, CH3SiCl3
	Other water-reactive wastes

Potential consequences: Fire, explosion, or heat generation; generation of flammable or toxic gases.

Group 4-A	**Group 4-B**
Alcohols	Concentrated waste in Groups 1-A or 1-B
Aldehydes	Group 2-A wastes
Halogenated hydrocarbons	
Nitrated hydrocarbons	
Unsaturated hydrocarbons	
Other reactive organic compounds and solvents	

Potential consequences: Fire, explosion, or violent reaction.

Group 5-A	**Group 5-B**
Spent cyanide and sulfide solutions	Group 1-B wastes

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas.

Group 6-A	**Group 6-B**

Chlorates	Acetic acid and other organic acids
Chlorine	Concentrated minerals acids
Chlorites	Group 2-A wastes
Chromic acid	Group 4-A wastes
Hypochlorites	Other flammable and combustible wastes
Nitrates	
Nitric acid, fuming	
Perchlorates	
Permanganates	
Peroxides	

Potential consequences: Fire explosion, or violent reaction.

18. Engineering Controls
    a. Intent. The engineering controls installed in the facility are intended to minimize employee exposure to chemical and physical hazards in the workplace. These controls must be maintained in proper working order for this goal to be realized.
    b. Modification. No modification of engineering controls will occur unless testing indicates that worker protection will continue to be adequate.
    c. Improper Function. Improper function of engineering controls must be reported to the Physical Plant immediately. The system shall be taken out of service until proper repairs have been executed.
    d. Usage
        i. Facility Fume Hoods
        The facility fume hoods shall be utilized for all chemical procedures which might result in release of hazardous chemical vapors or dust. As a general rule, the hood shall be used for all chemical procedures involving substances which are appreciably volatile with a threshold limit value (TLV) of less than 50 ppm or are flammable material. The following work practices shall apply to the use of hoods:
            (1) Confirm adequate hood ventilation performance prior to opening chemical containers inside the hood. An inward flow of air can be confirmed by holding a thin strip of tissue at the face of the hood and observing the movement of the paper.
            (2) Keep the sash of the hood at or below the indicated maximum operating height except when adjustments within the hood are being made. At these times, maintain the sash height as low as possible.
            (3) Chemicals and equipment used inside the hood shall be kept to a minimum and shall not block vents or air flow.
            (4) Minimize interferences with the inward flow of air into the hood.
            (5) Locate apparatus toward the rear of the hood to prevent vapors from escaping.

(6) Leave the hood operating when it is not in active use if hazardous chemicals are contained inside the hood or if it is uncertain whether adequate general facility ventilation will be maintained when the hood is non-operational.
(7) The hood shall not be used as a means of disposal for volatile chemicals.
(8) The ventilation system shall be inspected annually. The hood face velocity shall be at least 80-85 feet per minute. A record of each inspection shall be maintained.

ii. Glove Boxes and Isolation Rooms
The exhaust air from a glove box or isolation room will pass through scrubbers or other treatment before release into the regular exhaust system.

iii. Flammable Storage Cabinets
(1) Cabinets designed for the safe storage of flammable chemicals can only do so if used and maintained properly. Cabinets are generally made of doubled-walled construction and are made of 18 gauge steel. The doors are two inches above the base of the cabinet and are liquid proof to that point. Two vents are provided on opposite sides of the cabinet and are equipped with flame-arrester screens.
(2) Cabinets must have sticker/permanent marking on the outside of the cabinet indicating the contents within are flammable.
(3) Always read the manufacturer's information and follow prudent safety practices such as:
a. Store only compatible materials inside the cabinet.
b. Store chemicals of similar vapor density together when using mechanical ventilation (e.g., heavier than air vapors are vented through the bottom vent and lighter than air vapors through the top vent).
c. Do not store paper or cardboard inside cabinets with the chemicals.
d. Do not overload the cabinet.
e. Use ground devices for large quantities of flammable chemicals.

19. Safety Data Sheets
The safety data sheet (SDS) is the hazard communication tool that provides details on all important aspects of chemical use, handling, and storage. All SDSs must meet the GHS standard. The SDS shall be reviewed when working with the chemical for the first time or when training staff. The OSHA Hazard Communication standard (29 CFR 1910.1200) requires manufactures to provide SDSs at no cost. NOTE: Online MSDS are permitted as long as documented training has occurred for all facility personnel.

a. Section I
i. Manufacture's name, address and telephone number
ii. Number to call in case of emergency
iii. Chemical name and synonyms

iv. Chemical family and formula
v. Chemical Abstract Service (CAS) number that is a unique identification number for chemical reagents.
vi. Date of preparation.

b. Section II
Describes the various ingredient(s) contained in the product, the percentages of ingredients(s), and exposure limits when appropriate. This will include all hazardous chemicals that comprise 1% or greater of the mixture will be identified. Carcinogens must be listed if the concentrations are 0.1% or greater.

c. Section III
i. Boiling point
ii. Specific gravity
iii. Vapor pressure
iv. Percent volatile
v. Vapor density
vi. Evaporation rate
vii. Solubility in water
viii. Appearance and odor

d. Section IV
Describes the fire and explosion hazard data for the material. The appropriate extinguishing agent for fires involving the material will be listed. Special fire fighting procedures may also be listed.

e. Section V
Describes the known health hazard data for the material and exposure limits. Symptoms or health effects of an overexposure are listed. This information will help the user and medical personnel recognize if an overexposure has occurred.
i. Threshold limit value (TLV)
ii. Existing medical conditions that may be aggravated by exposure
iii. Effects of overexposure (e.g., headache, nausea, narcosis, eye irritation, weakness, skin rashes, etc.)
iv. Primary routes of exposure (i.e., inhalation, skin, ingestion)
v. Cancer or other special health hazards
vi. Emergency and first aid procedures

f. Section VI
Describes reactivity data; that is, the material's ability to react and release energy or heat under special conditions or when it comes in contact with certain substances.

g. Section VII
Gives instructions for the steps to be taken in case of an accidental release or spill. The steps normally include information on containment, evacuation procedures, and waste disposal. The statements on the SDS are general.

h. Section VIII
Describes the protective equipment for the individual who might have to work with the substance. This section normally describes worst case conditions; therefore, the extent to which personal protective equipment is

required is task dependent. Always review the appropriate departmental procedure. Equipment may include:

i. Respiratory equipment
ii. Ventilation
iii. Protective gloves
iv. Eye protection
v. Other protective equipment (i.e., special clothing)

i. Section IX
Describes handling and storage procedures to be taken with the material. Information may include statements such as: keep container closed; store in a cool, dry, well ventilated area; keep refrigerated; avoid exposure to sunlight.

j. Section X
Describes any special precautions or miscellaneous information regarding the material. In some cases, manufacturers may choose to withhold certain information on a SDS provided the information is trade secret. Regardless of the existence of trade secrets, the SDS must still contain all relevant hazard, protection, and health information.

k. Assumptions:
i. Some SDSs may not contain all ten sections or the information may be in a slightly different order. However, the basic information described above must be provided.
ii. Some SDSs are more complete than others. Do not assume everything you need to know is contained on the SDS. Do not assume if a section is left blank that there is no risk.

20. Compressed Gas Cylinders
a. Handling
i. The valve must be covered with its metal cover, if so designed, before moving or transporting it.
ii. A hand truck that has a chain or a belt to secure the cylinder shall be used for transportation.
iii. When the cylinder is in place it shall be clamped securely to the wall or counter top before the metal valve cover is removed.
iv. Every effort shall be made not to drop cylinders or allow them to strike other cylinders or walls violently.
v. When a cylinder becomes empty, use chalk and write on the cylinder EMPTY of MT and return it to the storage area and order another tank to replace it.
vi. Always consider a cylinder as being full, and handle them with care.
vii. Do not test a cylinder to see if it has gas in it by opening the valve without a regulator on it.
viii. If an outlet becomes clogged with ice or frozen, it shall be thawed with warm (not boiling) water applied only to the valve.
ix. Never use a flame on any cylinder or valve.

b. Usage
i. All compressed gas cylinders must be secured to the wall or counter top by chains or cylinder belt clamps.

ii. Make sure the correct pressure reducing regulator designed for the particular gas is used for each cylinder and be sure to test the cylinder and regulator for leaks.
iii. Before a regulator is removed from a cylinder valve, close the cylinder valve and release the gas from the regulator.
iv. Unless the cylinder valve has first been closed tightly, do not attempt to stop a leak between the cylinder and the regulator by tightening the union nut.
v. Never use oil or grease as a lubricant on valves or attachments of oxygen cylinders.
vi. Never use oxygen as a substitute for compressed air.
vii. If a leak is suspected, a soapy water solution works best to confirm the leak.
viii. If the leak cannot be remedied by closing a valve or tightening a packing nut, emergency action shall be taken. A cylinder in which a leak occurs shall be taken out of use immediately and handled as followed:
(1) Close the valve. Properly tag the cylinder and notify the supplier and the Environmental, Health and Safety Office.
(2) If it is a fuel gas cylinder, close the valve and take the cylinder outdoors well away from any source of ignition. Properly tag the cylinder and notify the supplier and the Environmental, Health and Safety Office.

c. Storage
i. Cylinders shall be stored in a safe, dry and well-ventilated area prepared and reserved for this purpose. Cylinders are not designed for temperatures in excess of 130°F (54°C). Therefore, do not store near heaters, radiators, furnaces, or any other heat source (continuous sunlight).
ii. Cylinders of oxygen shall not be stored within 20 feet of cylinders containing flammable gases or highly combustible materials.

21. Standard Operating Procedures for Common Chemical Classes

Standard operating procedures (SOP) are intended to provide you with general guidance on how to safely work with a specific class of chemical or hazard. This SOP is generic in nature. It addresses the use and handling of substances by hazard class only. In some instances, multiple SOPs may be applicable for a specific chemical (i.e., both the SOPs for flammable liquids and carcinogens would apply to benzene). If compliance with all the requirements of this standard operating procedure is not possible, the Chemical Hygiene Officer must develop a written procedure that will be used in its place. This alternate procedure must provide the same level of protection as the SOP it replaces. The Office of Environmental Health and Safety is available to provide guidance during the development of alternate procedures. Specific written procedures are the responsibility of the Chemical Hygiene Officer.

a. Acutely Toxic Gases
i. Securing of gas cylinders

Cylinders of compressed gases must be handled as high energy sources. When storing or moving a cylinder, have the cap securely in place to protect the stem. Use suitable racks, straps, chains or stands to support cylinders.

ii. Decontamination procedures

Personnel: Wash hands and arms with soap and water immediately after handling acutely toxic gases.

iii. Designated area

All locations within the facility where acutely toxic gases are handled shall be posted with designated area caution signs. This includes all fume hoods and bench tops where the acutely toxic gases are handled.

iv. Emergency procedure

Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:

(1) Who to contact: (University police, and Office of Environmental Health and Safety Officer, Chemical Hygiene Officer of the facility)
(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)
(3) The method used to alert personnel in nearby areas of potential hazards.
(4) Special first aid treatment required by the type of acutely toxic material(s) handled in the facility

v. Eye protection

Eye protection in the form of safety glasses must be worn at all times when handling acutely toxic gases. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash

Where the eyes or body of any person may be exposed to acutely toxic gases, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood

Manipulation of acutely toxic gases shall typically be carried out in a fume hood. All areas where acutely toxic gases are stored or manipulated must be labeled as a designated area.

viii. Glove (dry) box

Some processes involving acutely toxic gases may be performed in a properly vented glove box rather than a fume hood.

ix. Gloves

Gloves shall be worn when handling acutely toxic gases.

x. Hazard assessment

Hazard assessment shall focus on the education of employees concerning the health risk posed by acutely toxic gases, on proper use and handling procedures, the demarcation of designated areas, and emergency evacuation and notification procedures in the event of a spill.

x. Protective apparel

coats, closed toed shoes, and long sleeved clothing shall be worn when handling acutely toxic gases. The need for additional protective equipment will be determined by the Chemical Hygiene Officer or the Environmental, Health, and Safety Officer on a case-by-case basis.

xi. Safety shielding

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of acutely toxic gases which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower

A safety or drench shower shall be available in a nearby location where the acutely toxic gases are used.

xiv. Signs and labels

(1) Doorways: The room sign must contain a Designated Area Within caution sign where carcinogens, reproductive hazards, and/or acutely toxic chemicals are stored or used.

(2) Containers: All acutely toxic gas cylinders must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable. A label for acutely toxic gases is available (part number (S1728C).

xv. Special storage

Acutely toxic gases must be stored in a designated area. Special ventilation of the stored cylinders is required and must be approved by the Office of Environmental Health and Safety.

xvi. Special ventilation

Manipulation of acutely toxic gases outside of a fume hood will require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to acutely toxic gases in the facility and are the preferred ventilation control device. Always attempt to handle acutely toxic gases in a fume hood. If your research does not permit the handing of acutely toxic gases in your fume hood you must contact the Office of Environmental Health and Safety to review the adequacy of all special ventilation.

xvii. Spill response

In the event of an escape of gas, alert personnel in the area that a spill has occurred. Do not attempt to handle a spill of acutely toxic gases. Vacate the facility immediately and call for assistance.

(1) Office of Environmental Health & Safety 5177

(2) University Police 1-911 or 5350. This is a 24-hour service.

Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection

Not applicable

xix. Waste disposal

All empty or partially filled acutely toxic gas cylinders shall be returned to the supplier. If the supplier does not accept empty or partially filled cylinders, contact the Office of Environmental Health and Safety concerning disposal.

b. Acutely Toxic Chemicals

i. Securing of gas cylinders

Not applicable

ii. Decontamination procedures

(1) Personnel: Wash hands and arms with soap and water immediately after handling acutely toxic chemicals.

(2) Area: Decontamination procedures vary depending on the material being handled. The toxicity of some materials can be neutralized with other reagents. All surfaces shall be wiped with the appropriate cleaning agent following dispensing or handling. Waste materials generated shall be treated as a hazardous waste.

(3) Equipment: Decontaminate vacuum pumps or other contaminated equipment (glassware) before removing them from the designated area.

iii. Designated area

All locations within the facility where acutely toxic chemicals are handled shall be posted with designated area caution signs. This includes all fume hoods and bench tops where the acutely toxic chemicals are handled.

iv. Emergency procedure

Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:

(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)

(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)

(3) The method used to alert personnel in nearby areas of potential hazards

(4) Special first aid treatment required by the type of acutely toxic material(s) handled in the facility

v. Eye protection
Eye protection in the form of safety glasses must be worn at all times when handling acutely toxic chemicals. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes, therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash
Where the eyes or body of any person may be exposed to acutely toxic chemicals, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood
Manipulation of acutely toxic chemicals shall be carried out in a fume hood. If the use of a fume hood proves impractical refer to the section on special ventilation. All areas where acutely toxic chemicals are stored or manipulated must be labeled as a designated area.

viii. Glove (dry) box
Certain acutely toxic chemicals must be handled in a glove box rather than a fume hood.

ix. Gloves
Gloves shall be worn when handling acutely toxic chemicals. However, the handling of some acutely toxic chemicals will require chemical resistant gloves. workers shall review the MSDS for the acutely toxic agent and contact EHS for advice on glove selection.

x. Hazard assessment
Hazard assessment shall focus on proper use and handling procedures, the education of employees concerning the health risk posed by acutely toxic materials, and on the demarcation of designated areas.

xi. Protective apparel
coats, closed toed shoes, and long sleeved clothing shall be worn when handling acutely toxic chemicals. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding
Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of acutely toxic chemicals which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower

A safety or drench shower shall be available in a nearby location where the acutely toxic chemicals are used.

xiv. Signs and labels

(1) Doorways: The room sign must contain a Designated Area Within Caution where carcinogens, reproductive hazards, and/or acutely toxic chemicals are stored or used.

(2) Containers: All acutely toxic chemicals must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable. A label for acutely toxic chemicals is available (part number (available from EHRS, the cell center, or chemistry stockroom).

xv. Special storage

Acutely toxic chemicals must be stored in a designated area.

xvi. Special ventilation

(1) Manipulation of acutely toxic chemicals outside of a fume hood may require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to acutely toxic chemicals in the facility and are the preferred ventilation control device. Where possible handle acutely toxic chemicals in a fume hood. If the use of a fume hood proves impractical attempt to work in a glove box or in an isolated area on the facility bench top.

(2) If available, consider using a Biological Safety Cabinet. The biological safety cabinet is designed to remove the acutely toxic chemicals before the air is discharged into the environment. Acutely toxic chemicals that are volatile must not be used in a biological safety cabinet unless the cabinet is vented to the outdoors.

(3) If your research does not permit the handling of acutely toxic chemicals in a fume hood, biological safety cabinet, or glove box, you must contact the Office of Environmental Health and Safety.

(4) All areas where acutely toxic chemicals are stored or manipulated must be labeled as a designated area.

xvii. Spill response

(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This shall occur prior to the use of any acutely toxic chemical.

(2) In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of acutely toxic chemicals. Vacate the facility immediately and call for assistance.
Office of Environmental Health & Safety, 5177 or
University Police 1-911 or 5350. This is a 24-hour service.

(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection

(1) Evacuated glassware can implode and eject flying glass, and splattered chemicals. Vacuum work involving acutely toxic chemicals must be conducted in a fume hood, glove box or isolated in an acceptable manner.

(2) Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood.

xix. Waste disposal

All materials contaminated with acutely toxic chemicals shall be disposed of as a hazardous waste. Wherever possible, attempt to design research in a manner that reduces the quantity of waste generated.

c. Carcinogens

i. Securing of gas cylinders

Not applicable

ii. Decontamination procedures

(1) Personnel: Wash hands and arms with soap and water immediately after handling carcinogens.

(2) Area: Decontamination procedures vary depending on the material being handled. The toxicity of some materials can be neutralized with other reagents. All surfaces shall be wiped with the appropriate cleaning agent following dispensing or handling. Waste materials generated shall be treated as a hazardous waste.

(3) Equipment: Decontaminate vacuum pumps or other contaminated equipment (glassware) before removing them from the designated area.

iii. Designated area

All locations within the facility where carcinogens are handled shall be posted with designated area caution signs. This includes all fume hoods and bench tops where the carcinogens are handled.

iv. Emergency procedure

Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:

(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)

(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)

(3) The method used to alert personnel in nearby areas of potential hazards.

(4) Special first aid treatment required by the type of carcinogens handled in the facility.

v. Eye protection

Eye protection in the form of safety glasses must be worn at all times when handling carcinogens. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash

Where the eyes or body of any person may be exposed to carcinogens, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood

Manipulation of carcinogens shall be carried out in a fume hood. If the use of a fume hood proves impractical refer to the section on special ventilation. All areas where carcinogens are stored or manipulated must be labeled as a designated area.

viii. Glove (dry) box

Certain carcinogens must be handled in a glove box rather than a fume hood.

ix. Gloves

Gloves shall be worn when handling carcinogens.

x. Hazard assessment

Hazard assessment shall focus on proper use and handling techniques, education of facility workers concerning the health risks posed by carcinogens, and the demarcation of designated areas.

xi. Protective apparel

Lab coats/Aprons, closed toed shoes, and long sleeved clothing shall be worn when handling carcinogens. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of carcinogens which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower

A safety or drench shower shall be available in a nearby location where the carcinogens are used.

xiv. Signs and labels

(1) Doorways: The room sign must contain a Designated Area Within Caution where carcinogens, reproductive hazards, and/or acutely toxic chemicals are stored or used.
(2) Containers: All containers of carcinogens must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

xv. Special storage

Carcinogens must be stored in a designated area.

xvi. Special ventilation

(1) Manipulation of carcinogens outside of a fume hood may require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to carcinogens in the facility and are the preferred ventilation control device. When possible, handle carcinogens in a fume hood. If the use of a fume hood proves impractical, attempt to work in a glove box or on an isolated area on the bench top.
(2) If available, consider using a Biological Safety Cabinet. The biological safety cabinet is designed to remove particulates (the carcinogen) before the air is discharged into the environment. Carcinogens that are volatile must not be used in a biological safety cabinet unless the cabinet is vented to the outdoors.
(3) If your research does not permit the handling of carcinogens in a fume hood, biological safety cabinet, or glove box, you must contact the Office of Environmental Health and Safety.
(4) All areas where carcinogens are stored or manipulated must be labeled as a designated area.

xvii. Spill response

(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This shall occur prior to the use of any carcinogen.
(2) In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of carcinogenic material. Vacate the facility immediately and call for assistance.
Office of Environmental Health & Safety, 5177, or University Police 1-911 or 5350. This is a 24-hour service.
(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection

(1) Evacuated glassware can implode and eject flying glass, and splattered chemicals. Vacuum work involving carcinogens must be conducted in a fume hood, glove box or isolated in an acceptable manner.
(2) Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate

release. The exhaust for the pumps must be vented into an exhaust hood.

xix. Waste disposal
All materials contaminated with carcinogens shall be disposed of as hazardous waste. Wherever possible, attempt to design research in a manner that reduces the quantity of waste generated. Questions regarding waste pick up shall be directed to the Office of Environmental Health and Safety.

d. Compressed Gases

i. Securing of gas cylinders

(1) Cylinders of compressed gases must be handled as high energy sources. They pose a serious hazard if the cylinder valve is dislodged. When storing or moving a cylinder, have the cap securely in place to protect the stem. Use suitable racks, straps, chains or stands to support cylinders.

(2) Do not store cylinders or lecture bottles with the regulator in place. If the regulator fails, the entire contents of the gas cylinder may be discharged.

ii. Decontamination procedures
Not Applicable

iii. Designated area
Compressed gas cylinders which contain acutely toxic gases must be stored in a designated area. See the SOP for acutely toxic compressed gases.

iv. Emergency procedure
Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptoms of overexposure must be developed. The procedures shall address as a minimum the following:

(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)

(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)

(3) The method used to alert personnel in nearby areas of potential hazards.

(4) Special first aid treatment required by the type of compressed gas handled in the facility

v. Eye protection
Eye protection in the form of safety glasses must be worn at all times when adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields.

vi. Eyewash
Not applicable.

vii. Fume hood

Manipulation of compressed gases shall typically be carried out in a fume hood if the compressed gas is an irritant, oxidizer, asphyxiant, or has other hazardous properties.

viii. Glove (dry) box
Not applicable

ix. Gloves
Not applicable

x. Hazard assessment
Hazard assessment for work with compressed gases shall assure that all staff understands proper use and handling precautions; that all pressurized equipment is properly shielded; regulators are not interchanged between different gas types; all hose connections are properly secured and are appropriate for the pressure(s) used.

xi. Protective apparel
coats, closed toed shoes, and long sleeved clothing shall be worn when handling compressed gases.

xii. Safety shielding
Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of compressed gases which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower
Not applicable

xiv. Signs and labels
Containers: All compressed gases must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable. The compressed gas cylinder shall be labeled to indicate if the container is full or empty.

xv. Special storage
(1) Cylinders shall be stored in an upright position and secured to a wall or facility bench through the use of chains or straps. Cylinder caps shall remain on the cylinder at all times unless a regulator is in place. Cylinders shall be stored in areas where they will not become overheated. Avoid storage near radiators, areas in direct sunlight, steam pipes and heat releasing equipment such as sterilizers.
(2) Transport compressed gas cylinders on equipment designed for this function. Never carry or "walk" cylinders by hand.

xvi. Special ventilation
Manipulation of compressed gas that is an irritant, oxidizer, asphyxiant, or has other hazardous properties outside of a fume hood may require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to compressed gases in the facility and are the preferred ventilation control device.

xvii. Spill response

(1) If damage has occurred to a cylinder, please follow the emergency procedures outlined in (iv.)
(2) In the event of a release of acutely toxic gases, alert personnel in the area that a release has occurred. Vacate the facility immediately and call for assistance. Office of Environmental Health & Safety, 5177, or University Police 1-911 or 5350. This is a 24-hour service.
(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection
Not applicable

xix. Waste disposal
All empty or partially filled compressed gas cylinders shall be returned to the supplier. If the supplier does not accept empty or partially filled cylinders, contact the Office of Environmental Health and Safety concerning disposal.

e. Corrosive Chemicals

i. Securing of gas cylinders
Not applicable

ii. Decontamination procedures
(1) Personnel: Immediately flush contaminated area with copious amounts of water after contact with corrosive materials. Remove any jewelry to facilitate removal of chemicals. If a delayed response is noted, report immediately for medical attention. Be prepared to detail what chemicals were involved.
(2) If the incident involves Hydrofluoric acid (HF), seek immediate medical attention.
(3) If there is any doubt about the severity of the injury, seek immediate medical attention.
(4) Area: Decontamination procedures vary depending on the material being handled. The corrosivity of some materials can be neutralized with other reagents. Special neutralizing agents shall be on hand to decontaminate areas.

iii. Designated area
Not applicable

iv. Emergency procedure
Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:
(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)
(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)
(3) The method used to alert personnel in nearby areas of potential hazards.

(4) Special first aid treatment required by the type of corrosive material(s) handled in the facility.

v. Eye protection
Eye protection in the form of safety glasses must be worn at all times when handling corrosive materials. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn. It is recommended that face shields be worn when a splash potential exists with corrosive materials.

vi. Eyewash
Where the eyes or body of any person may be exposed to corrosive chemicals, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood
Manipulation of corrosive substances shall be carried out in a fume hood if corrosive vapor production is anticipated.

viii. Glove (dry) box
Not applicable

ix. Gloves
Gloves shall be worn when handling corrosive chemicals.

x. Hazard assessment
Hazard assessment shall include instruction on proper use and handling; spill control; and splash protection.

xi. Protective apparel
coats, closed toed shoes, and long sleeved clothing shall be worn when handling corrosive materials. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding
Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of corrosive materials which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower
A safety or drench shower shall be available in a nearby location where the corrosive material is used.

xiv. Signs and labels
Containers: All corrosive chemical must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

xv. Special storage

Segregate the various types of corrosives. Separate acids and bases. Liquids and solids shall also be separated. Specially designed corrosion resistant cabinets shall be used for the storage of large quantities of corrosive materials. Store corrosives on plastic trays. Do not store corrosive materials on high cabinets or shelves.

xvi. Special ventilation
Manipulation of some corrosive materials outside of a fume hood may require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to corrosive materials in the facility and are the preferred ventilation control device.

xvii. Spill response
(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This shall occur prior to the use of any corrosive chemical. Corrosive spill controls neutralize the hazardous nature of the spilled material. Acids and bases require different types of spill control materials.
(2) In the event of a spill, all personnel in the area shall be alerted. Do not attempt to handle a large spill of corrosive materials. Vacate the facility immediately and call for assistance.
Office of Environmental Health & Safety, 5177
University Police 1-911 or 5350. This is a 24-hour service.
(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection
Not applicable

xix. Waste disposal
Most corrosive materials are hazardous wastes. Questions regarding waste disposal shall be directed to the Office of Environmental Health and Safety.

f. Flammable Liquids

i. Securing of gas cylinders
Not applicable

ii. Decontamination procedures
Personnel: Wash hands and arms with soap and water immediately following any skin contact with flammable liquids.

iii. Designated area
Not applicable

iv. Emergency procedure
Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:

(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)
(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)
(3) The method used to alert personnel in nearby areas of potential hazards.
(4) Special spill control materials required by the type of flammable liquids handled in the facility.

v. Eye protection
Eye protection in the form of safety glasses must be worn at all times when handling flammable liquids. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash
Where the eyes or body of any person may be exposed to flammable liquids suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood
When possible, experiments involving greater than 500 ml of flammable liquids shall be carried out in a fume hood.

viii. Glove (dry) box
Not applicable

ix. Gloves
Gloves shall be worn when handling flammable liquids.

x. Hazard assessment
Hazard assessment for work involving flammable liquids shall thoroughly address the issues of proper use and handling, fire safety, chemical toxicity, storage, and spill response.

xi. Protective apparel
coats, closed toed shoes, and long sleeved clothing shall be worn when handling flammable liquids. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding
Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of flammable liquids which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Safety shielding is required any time there is a risk of explosion, splash hazard or a

highly exothermic reaction. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower
A safety or drench shower shall be available in a nearby location where the flammable liquids are used.

xiv. Signs and labels
Containers: All flammable liquids must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

xv. Special storage
The storage of flammable and combustible liquids in a facility, shop or building area must be kept to the minimum needed for research and/or operations. If more than 5 gallons of flammables are present outside of safety cans per 100 square feet of area, a flammable-liquids storage cabinet is required. Flammable-liquids storage cabinets are not intended for the storage of highly toxic materials, acids, bases, compressed gases or pyrolytic chemicals.

xvi. Special ventilation
Manipulation of flammable liquids outside of a fume hood may require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to flammable liquids in the facility and are the preferred ventilation control device. Always attempt to handle large quantities of flammable liquids in a fume hood. If your research does not permit the handing of large quantities of flammable liquids in your fume hood, contact the Office of Environmental Health and Safety to review the adequacy of all special ventilation.

xvii. Spill response
(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This shall occur prior to the use of any flammable liquids. Spill supplies for flammable liquids are designed to control the liquid portion of the spill and minimize the production of flammable vapors. Never use paper towels on large spills of flammable liquids because it exacerbates vapor production.
(2) In the event of a spill all personnel in the area shall be alerted. Turn off all sources of ignition. Do not attempt to handle a large spill of flammable liquids. Vacate the facility immediately and call for assistance. Office of Environmental Health & Safety, 5177
University Police 1-911 or 5350. This is a 24-hour service.
(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection
(1) Evacuated glassware can implode and eject flying glass, and splattered chemicals. Vacuum work involving flammable liquids must be conducted in a fume hood, glove box or isolated in an acceptable manner.

(2) Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood. Vacuum pumps shall be rated for use with flammable liquids.

xix. Waste disposal

Some flammable liquids are hazardous wastes. Questions regarding waste disposal shall be directed to the Office of Environmental Health and Safety.

g. Oxidizing Chemicals

i. Securing of gas cylinders

Not applicable

ii. Decontamination procedures

(1) Personnel: Wash hands and arms with soap and water immediately after handling oxidizing chemicals.

(2) Area: Carefully clean work area after use. Paper towels or similar materials contaminated with strong oxidizing chemicals may pose a fire risk.

iii. Designated area

Not applicable

iv. Emergency procedure

Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:

(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)

(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)

(3) The method used to alert personnel in nearby areas of potential hazards.

(4) Special first aid treatment required by the type of oxidizing chemicals material(s) handled in the facility

v. Eye protection

Eye protection in the form of safety glasses must be worn at all times when handling oxidizing chemicals. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash

Where the eyes or body of any person may be exposed to oxidizing chemicals, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood
The use of certain concentrations of perchloric acid must be performed in a fume hood equipped with wash down facilities. Contact the Office of Environmental Health and Safety for fume hood requirements.

viii. Glove (dry) box
Not applicable

ix. Gloves
Gloves shall be worn when handling oxidizing chemicals.

x. Hazard assessment
Hazard assessment shall address proper use and handling techniques, fire safety, storage, and waste disposal issues.

xi. Protective apparel
coats, closed toed shoes, and long sleeved clothing shall be worn when handling oxidizing chemicals. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding
Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of oxidizing chemicals which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower
A safety or drench shower shall be available in a nearby location where the oxidizing chemicals are used.

xiv. Signs and labels
Containers: All oxidizing chemicals must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

xv. Special storage
(1) Oxidizers shall be stored in a cool and dry location. Keep oxidizers segregated from all other chemicals in the facility. Minimize the quantities of strong oxidizers stored in the facility.
(2) Never return excess chemicals to the original container. Small amounts of impurities may be introduced into the container which may cause a fire or explosion.

xvi. Special ventilation
The use of certain concentrations of perchloric acid must be performed in a fume hood equipped with wash down facilities. Contact the Office of Environmental Health and Safety for fume hood requirements.

xvii. Spill response
(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies

can be determined by consulting the material safety data sheet. This shall occur prior to the use of any oxidizing chemicals. Spill control materials for oxidizers are designed to be inert and will not react with the reagent. Never use paper towels or other inappropriate materials which are combustible. The waste materials generated during spill cleanup may pose a flammability risk and shall not remain in the facility overnight unless it is stored in an appropriate container.

(2) In the event of a spill. Alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of oxidizing chemicals. Vacate the facility immediately and call for assistance. Office of Environmental Health & Safety, 5177
University Police 1-911 or 5350. This is a 24-hour service.

(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection

(1) Evacuated glassware can implode and eject flying glass, and splattered chemicals. Vacuum work involving oxidizing chemicals must be conducted in a fume hood, glove box or isolated in an acceptable manner.

(2) Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood.

xiv. Waste disposal

All materials contaminated with oxidizing chemicals pose a fire hazard and shall be disposed of as hazardous waste. Alert the Office of Environmental Health and Safety if you generate wastes contaminated by oxidizers. Do not let contaminated wastes remain in the facility overnight unless proper containers are provided.

Examples of Strong Oxidizers

Ammonium perchlorate	Ammonium permanganate
Barium peroxide	Bromine
Calcium chlorate	Calcium hypochlorite
Chlorine trifluoride	Chromium anhydride
Chromic acid	Dibenzoyl peroxide
Fluorine	Hydrogen peroxide
Magnesium peroxide	Nitrogen trioxide
Perchloric acid	Potassium bromate
Potassium chlorate	Potassium peroxide
Propyl nitrate	Sodium chlorate
Sodium chlorite	Sodium perchlorate
Sodium peroxide	

h. Pyrophoric Chemicals

i. Securing of gas cylinders

Not applicable

ii. Decontamination procedures

Personnel: Wash hands and arms with soap and water immediately following any skin contact with pyrophoric chemicals.

iii. Designated area
Not applicable

iv. Emergency procedure
Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:
(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)
(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)
(3) The method used to alert personnel in nearby areas of potential hazards.
(4) Special spill control materials required by the type of pyrophoric chemicals handled in the facility

v. Eye protection
Eye protection in the form of safety glasses must be worn at all times when handling pyrophoric chemicals. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash
Where the eyes or body of any person may be exposed to pyrophoric chemicals, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood
Many pyrophoric chemicals release noxious or flammable gases and shall be handled in a hood. In addition, some pyrophoric materials are stored under kerosene (or other flammable solvents); therefore, the use of a fume hood is required to prevent the release of flammable vapors in the facility. Glove boxes may be also being used (see special ventilation).

viii. Glove (dry) box
Glove boxes may be used to handle pyrophoric chemicals if inert or dry atmospheres are required.

ix. Gloves
Gloves shall be worn when handling pyrophoric chemicals.

x. Hazard assessment

Hazard assessment for work involving pyrophoric chemicals shall thoroughly address the issue of fire safety (including the need for Class D fire extinguishers), proper use and handling techniques, chemical toxicity, storage, and spill response.

xi. Protective apparel

coats, closed toed shoes, and long sleeved clothing shall be worn when handling pyrophoric chemicals. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of pyrophoric chemicals which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower

A safety or drench shower shall be available in a nearby location where the pyrophoric chemicals are used.

xiv. Signs and labels

Containers: All pyrophoric chemicals must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

xv. Special storage

(1) Pyrophoric chemicals shall be stored under an atmosphere of inert gas or under kerosene as appropriate. Do not store pyrophoric chemicals with flammable materials or in a flammable-liquids storage cabinet. Store these materials away from sources of ignition. Minimize the quantities of pyrophoric chemicals stored in the facility.

(2) Never return excess chemicals to the original container. Small amounts of impurities may be introduced into the container which may cause a fire or explosion.

xvi. Special ventilation

Always attempt to handle pyrophoric chemicals in a fume hood or glove box. If your research does not permit the handing of pyrophoric chemicals in a fume hood or glove box, you must contact the Office of Environmental Health and Safety to review the adequacy of all special ventilation.

xvii. Spill response

(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This shall occur prior to the use of any pyrophoric chemicals. Spill control materials for pyrophoric chemicals are designed to be inert and will not react with the reagent.

(2) In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of pyrophoric chemicals. Turn off all ignition sources and vacate the facility immediately. Call for assistance. Office of

Environmental Health & Safety, 5177, or University Police 1-911 or 5350. This is a 24-hour service.

(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection

(1) Evacuated glassware can implode and eject flying glass, and splattered chemicals. Vacuum work involving pyrophoric chemicals must be conducted in a fume hood or isolated in an acceptable manner.

(2) Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate release. The exhaust for the pumps must be vented into an exhaust hood. Vacuum pumps shall be rated for use with pyrophoric chemicals.

xix. Waste disposal

All materials contaminated with pyrophoric chemicals shall be disposed of as hazardous waste. Alert the Office of Environmental Health and Safety if you generate wastes contaminated with pyrophoric chemicals. These wastes may pose a flammability risk and shall not remain in the facility overnight.

i. Reactive Solids

i. Securing of gas cylinders

Not applicable

ii. Decontamination procedures

(1) Personnel: Wash hands and arms with soap and water immediately after handling reactive solids.

(2) Area: Carefully clean work area after use.

iii. Designated area

Not applicable

iv. Emergency procedure

Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:

(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)

(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)

(3) The method used to alert personnel in nearby areas of potential hazards.

(4) The location and quantity of all reactive solids in the facility

(5) Special first aid treatment required by the type of reactive solids material(s) handled in the facility

v. Eye protection

Eye protection in the form of safety glasses must be worn at all times when handling reactive solids. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to

popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash
Where the eyes or body of any person may be exposed to reactive solids, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood
Many reactive solids will liberate hydrogen when they react with water. The use of a fume hood is recommended to prevent the buildup of combustible gases.

viii. Glove (dry) box
Glove boxes may be used to handle reactive solids if inert or dry atmospheres are required.

ix. Gloves
Gloves shall be worn when handling reactive solids.

x. Hazard assessment
Hazard assessment of work involving reactive solids shall address proper use and handling techniques, fire safety (including the need for Class D fire extinguishers), storage, potential peroxide formation, water and air reactivity, and waste disposal issues.

xi. Protective apparel
coats, closed toed shoes, and long sleeved clothing shall be worn when handling reactive solids. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding
Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of reactive solids which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower
A safety or drench shower shall be available in a nearby location where the reactive solid is used.

xiv. Signs and labels
Containers: All reactive solids must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

xv. Special storage
(1) Reactive solids shall be stored in a cool and dry location. Keep reactive solids segregated from all other chemicals in the facility. Minimize the quantities of reactive solids stored in the facility.

(2) Date all containers upon receipt. Potassium will form peroxides and superoxides when stored under oil at room temperature. Examine storage containers frequently. Dispose of any container that exhibits salt build up on its exterior. Dispose of all reactive solids whenever they are no longer required for current research.

(3) Never return excess chemicals to the original container. Small amounts of impurities may be introduced into the container which may cause a fire or explosion.

xvi. Special ventilation

Special ventilation is required if these materials are used outside of a fume hood or glove box. If your research does not permit the handing of reactive solids in a fume hood or glove box, you must contact the Office of Environmental Health and Safety to review the adequacy of all special ventilation.

xvii. Spill response

(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This shall occur prior to the use of any reactive solids chemical. Spill control materials for reactive solids are designed to be inert and will not react with the reagent.

(2) In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of reactive solids. Turn off all ignition sources and vacate the facility immediately. Call for assistance. Office of Environmental Health & Safety, 5177, or University Police 1-911 or 5350. This is a 24-hour service.

(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection

Not applicable

xix. Waste disposal

All materials contaminated with reactive solids shall be disposed of as hazardous waste. Alert the Office of Environmental Health and Safety if you generate wastes contaminated by reactive solids. These wastes may pose a flammability risk and shall not remain in the facility overnight.

j. Reactive Liquids

i. Securing of gas cylinders

Not applicable

ii. Decontamination procedures

(1) Personnel: Wash hands and arms with soap and water immediately after handling reactive liquids.

(2) Area: Carefully clean work area after use.

(3) Equipment: Decontaminate vacuum pumps or other contaminated equipment (glassware) before removing them from the designated area.

iii. Designated area
Not applicable

iv. Emergency procedure
Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of signs and symptoms of overexposure must be developed. The procedures shall address as a minimum the following:
(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)
(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)
(3) The method used to alert personnel in nearby areas of potential hazards.
(4) The location and quantity of all reactive liquids in the facility
(5) Special first aid treatment required by the type of reactive liquids handled in the facility

v. Eye protection
Eye protection in the form of safety glasses must be worn at all times when handling reactive liquids. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87.1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash
Where the eyes or body of any person may be exposed to reactive liquids, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood
Many reactive liquids will ignite or liberate combustible gas when exposed to water vapor or air. The use of a fume hood is recommended to prevent the buildup of flammable gases.

viii. Glove (dry) box
A glove box may be used to handle reactive liquids if an inert or dry atmosphere is required.

ix. Gloves
Gloves shall be worn when handling reactive liquids.

x. Hazard assessment
Hazard assessment of work involving reactive liquids shall address proper use and handling techniques, fire safety (including the need for Class D fire extinguishers), storage, the specific reactive nature of the material (such as water and air reactivity), and waste disposal issues.

xi. Protective apparel
coats, closed toed shoes, and long sleeved clothing shall be worn when handling reactive liquids. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding
Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of reactive liquids that pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower
A safety or drench shower shall be available in a nearby location where the reactive liquids are used.

xiv. Signs and labels
Containers: All reactive liquids must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

xv. Special storage
(1) Reactive liquids shall be stored in a cool and dry location. Keep reactive liquids segregated from all other chemicals in the facility. Minimize the quantities of reactive liquids stored in the facility.
(2) Date all containers upon receipt. Examine storage containers frequently. Dispose of any container that exhibits salt build up on its exterior. Dispose of all reactive liquids whenever they are no longer required for current research.
(3) Never return excess chemicals to the original container. Small amounts of impurities may be introduced into the container that may cause a fire or explosion.

xvi. Special ventilation
Special ventilation may be required if these materials are used outside a fume hood. If your research does not permit the handing of reactive liquids in a fume hood you must contact the Office of Environmental Health and Safety to review the adequacy of all special ventilation.

xvii. Spill response
(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This shall occur prior to the use of any reactive liquids. Spill control materials for reactive liquids are designed to be inert and will not react with the reagent.
(2) In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a spill of reactive liquids. Turn off all ignition sources and vacate the facility immediately. Call for assistance. Office of Environmental Health & Safety, 5177, or University Police 1-911 or 5350. This is a 24-hour service.

(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection

Not applicable

xix. Waste disposal

All materials contaminated with reactive liquids shall be disposed of as hazardous waste. Alert the Office of Environmental Health and Safety if you generate wastes contaminated by reactive liquids. These wastes may pose a flammability risk and shall not remain in the facility overnight.

k. Reproductive Hazards

l. Securing of gas cylinders

Not applicable

ii. Decontamination procedures

(1) Personnel: Wash hands and arms with soap and water immediately after handling reproductive hazards.

(2) Area: Decontamination procedures vary depending on the material being handled. The toxicity of some materials can be neutralized with other reagents. All surfaces shall be wiped with the appropriate cleaning agent following dispensing or handling. Waste materials generated shall be treated as hazardous waste.

(3) Equipment: Decontaminate vacuum pumps or other contaminated equipment (glassware) before removing them from the designated area.

iii. Designated area

All locations within the facility where reproductive hazards are handled shall be posted with designated area caution signs. This includes all fume hoods and bench tops where the reproductive hazards are handled.

iv. Emergency procedure

Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:

(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)

(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)

(3) The method used to alert personnel in nearby areas of potential hazards.

(4) The location and quantity of all reproductive hazards stored in the facility.

(5) Special first aid treatment required by the type of reproductive hazards handled in the facility

v. Eye protection

Eye protection in the form of safety glasses must be worn at all times when handling reproductive hazards. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the American Standard Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for a splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash

Where the eyes or body of any person may be exposed to reproductive hazards, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood

Manipulation of reproductive hazards shall be carried out in a fume hood. If the use of a fume hood proves impractical refer to the section on special ventilation. All areas where reproductive hazards are stored or manipulated must be labeled as a designated area.

viii. Glove (dry) box

Certain reproductive hazards must be handled in a glove box rather than a fume hood.

ix. Gloves

Gloves shall be worn when handling reproductive hazards.

x. Hazard assessment

Hazard assessment shall focus on proper handling techniques, education of facility workers concerning the health risks posed by reproductive hazards, and the demarcation of designated areas.

xi. Protective apparel

coats, closed toed shoes, and long sleeved clothing shall be worn when handling reproductive hazards. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding

Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of reproductive hazards which pose this risk shall be performed in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower

A safety or drench shower shall be available in a nearby location where the reproductive hazards are used.

xiv. Signs and labels

(1) Doorways: The room sign must contain a Designated Area Within Caution where carcinogens, reproductive hazards, and/or acutely toxic chemicals are stored or used.

(2) Containers: All containers of reproductive hazards must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

xv. Special storage

Reproductive hazards must be stored in a designated area.

xvi. Special ventilation

(1) Manipulation of reproductive hazards outside of a fume hood may require special ventilation controls in order to minimize exposure to the material. Fume hoods provide the best protection against exposure to reproductive hazards in the facility and are the preferred ventilation control device. When possible, handle reproductive hazards in a fume hood. If the use of a fume hood proves impractical attempt to work in a glove box or on an isolated area of the bench top.

(2) If available, consider using a Biological Safety Cabinet. The biological safety cabinet is designed to remove particulates (the reproductive hazard) before the air is discharged into the environment. Reproductive hazards that are volatile must not be used in a biological safety cabinet unless the cabinet is vented to the outdoors.

(3) If your research does not permit the handing of reproductive hazards in a fume hood, biological safety cabinet, or glove box, you must contact the Office of Environmental Health and Safety.

All areas where reproductive hazards are stored or manipulated must be labeled as a designated area.

xvii. Spill response

(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This shall occur prior to the use of any reproductive hazard.

(2) In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a spill of reproductive hazards. Vacate the facility immediately and call for assistance. Office of Environmental Health & Safety, 5177, or University Police 1-911 or 5350. This is a 24-hour service.

(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection

(1) Evacuated glassware can implode and eject flying glass, and splattered chemicals. Vacuum work involving reproductive hazards must be conducted in a fume hood, glove box or isolated in an acceptable manner.

(2) Mechanical vacuum pumps must be protected using cold traps and, where appropriate, filtered to prevent particulate

release. The exhaust for the pumps must be vented into an exhaust hood.

xix. Waste disposal
All materials contaminated with reproductive hazards shall be disposed of as a hazardous waste. Wherever possible, attempt to design research in a manner that reduces the quantity of waste generated.

l. Water Sensitive Chemicals

i. Securing of gas cylinders
Not applicable

ii. Decontamination procedures
(1) Personnel: Wash hands and arms with soap and water immediately after handling water sensitive chemicals.
(2) Area: Carefully clean work area after use.

iii. Designated area
Not applicable

iv. Emergency procedure
Emergency procedures which address response actions to fires, explosions, spills, injury to staff, or the development of sign and symptom of overexposure must be developed. The procedures shall address as a minimum the following:
(1) Who to contact: (University police, and Office of Environmental Health and Safety, Chemical Hygiene Officer of the facility)
(2) The location of all safety equipment (showers, eye wash, fire extinguishers, etc.)
(3) The method used to alert personnel in nearby areas of potential hazards.
(4) The location and quantity of all water sensitive chemicals in the facility.
(5) Special first aid treatment required by the type of water sensitive chemicals handled in the facility

v. Eye protection
Eye protection in the form of safety glasses must be worn at all times when handling water sensitive chemicals. Ordinary (street) prescription glasses do not provide adequate protection. (Contrary to popular opinion these glasses cannot pass the rigorous test for industrial safety glasses.) Adequate safety glasses must meet the requirements of the American Standard Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87. 1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes; therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

vi. Eyewash
Where the eyes or body of any person may be exposed to water sensitive chemicals, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work

area for immediate emergency use. Bottle type eyewash stations are not acceptable.

vii. Fume hood
Many water sensitive chemicals will liberate hydrogen when they react with water. The use of a fume hood is recommended to prevent the buildup of combustible gases.

viii. Glove (dry) box
A glove box may be used to handle water sensitive chemicals when a dry atmosphere is required.

ix. Gloves
Gloves shall be worn when handling water sensitive chemicals.

x. Hazard assessment
Hazard assessment of work involving water sensitive chemicals shall address proper use and handling techniques, fire safety (including the need for Class D fire extinguishers), storage, water reactivity, and waste disposal issues.

xi. Protective apparel
coats, closed toed shoes, and long sleeved clothing shall be worn when handling water sensitive chemicals. Additional protective clothing shall be worn if the possibility of skin contact is likely.

xii. Safety shielding
Safety shielding is required any time there is a risk of explosion, splash hazard or a highly exothermic reaction. All manipulations of water sensitive chemicals which pose this risk shall occur in a fume hood with the sash in the lowest feasible position. Portable shields, which provide protection to all facility occupants, are acceptable.

xiii. Safety shower
A safety or drench shower shall be available in a nearby location where the water sensitive chemicals are used.

xiv. Signs and labels
Containers: All water reactive chemicals chemical must be clearly labeled with the correct chemical name. Handwritten labels are acceptable; chemical formulas and structural formulas are not acceptable.

xv. Special storage
(1) Water sensitive chemicals shall be stored in a cool and dry location. Keep water sensitive chemicals segregated from all other chemicals in the facility. Minimize the quantities of water sensitive chemicals stored in the facility.
(2) Date all containers upon receipt. Potassium will form peroxides and superoxides when stored under oil at room temperature. Examine storage containers frequently. Dispose of any container that exhibits salt build up on its exterior. Dispose of all water sensitive chemicals whenever they are no longer required for current research.
(3) Never return excess chemicals to the original container. Small amounts of impurities may be introduced into the container which may cause a fire or explosion.

xvi. Special ventilation

Special ventilation is required if these materials are used outside of a fume hood. If your research does not permit the handing of water sensitive chemicals in a fume hood you must contact the Office of Environmental Health and Safety to review the adequacy of all special ventilation.

xvii. Spill response

(1) Anticipate spills by having the appropriate clean up equipment on hand. The appropriate clean up supplies can be determined by consulting the material safety data sheet. This shall occur prior to the use of any water sensitive chemicals. Spill control materials for water sensitive chemicals are designed to be inert and will not react with the reagent. Do not put water on the spill.

(2) In the event of a spill alert personnel in the area that a spill has occurred. Do not attempt to handle a large spill of water sensitive chemicals. Turn off all ignition sources and vacate the facility immediately. Call for assistance. Office of Environmental Health & Safety, 5177, or University Police 1-911 or 5350. This is a 24-hour service.

(3) Remain on the scene, but at a safe distance, to receive and direct safety personnel when they arrive.

xviii. Vacuum protection

Not applicable

xix. Waste disposal

All materials contaminated with water sensitive chemicals shall be disposed of as hazardous waste. Alert the Office of Environmental Health and Safety if you generate wastes contaminated by water sensitive chemicals. These wastes may pose a flammability risk and shall not remain in the facility overnight.

22. Hazardous Materials Locations

a. Chemical and Natural Science Building
   i. Laboratories
   ii. Stock Room

b. Physical Plant
   i. Auto Shop
   ii. Grounds Department
   iii. Maintenance Shop
   iv. Custodial Department
   v. Physical Plant Warehouse

d. Pharmacy (Bienville) Building
   i. Laboratories
   ii. Stock Room
   iii. Waste Accumulation Area

e. Brown Stadium
   i. 1st Floor (Natural History Museum Storage)

f. Garrett Hall
   i. Laboratories

g. Hanna Hall

- i. Natural History Museum

h. Sugar Hall
- i. Laboratories
- ii. Waste Accumulation Area

i. Kitty Degree Hall
- i. Laboratories

j. Caldwell Hall
- i. Laboratories

k. Brown Hall
- i. Theater Scene Shop
- ii. Laboratories

l. Stubbs Hall
- i. Art Studios

m. Bry Hall
- i. Art Studios

n. VAPA Annex
- i. Art Shop

***See Cameo data for individual Chemical Inventories.