

**UNIVERSITY OF ARKANSAS
CHEMICAL HYGIENE PLAN**

**OFFICE OF ENVIRONMENTAL HEALTH AND SAFETY
FACILITIES MANAGEMENT DEPARTMENT**

UNIVERSITY OF ARKANSAS

Revised October 10, 2008

EMERGENCY CONTACT INFORMATION

Revised 1/11/2007

FOR FIRE EMERGENCIES, NOTIFY

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Ron Edwards	575-6185	957-5929	750-9325
Mike Johnson	575-6601	263-4157	582-2443
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* Call if the incident involves the Agriculture Farm.

** Call if the incident involves the Southwest Calibration Center at Engineering Research on 700 Research Center Boulevard.

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PURPOSE AND SCOPE

The University of Arkansas is committed to preserving and protecting the health and safety of students, faculty, staff, the surrounding community, and the environment. Believing that it is prudent to minimize all chemical exposure, the University's Toxic Substances Committee (TSC) and the Office of Environmental Health and Safety (EH&S) provides this Chemical Hygiene Plan as guidance regarding the safe use, storage, and handling of chemicals that may be present in University laboratories. This Plan applies to all laboratories at the University of Arkansas where chemicals are stored or used. For purposes of this Plan, shops and studios are also considered to be laboratories. The 90-day hazardous waste accumulation facility is addressed separately in Appendix I.

REGULATORY AND POLICY REQUIREMENTS

The Chemical Hygiene Plan was written to conform with the Occupational Safety and Health Administration (OSHA) laboratory safety standard 29 CFR 1910.1450; the Resource Conservation and Recovery Act (RCRA) of 1984; and the Arkansas Department of Pollution Control and Ecology (ADPC&E) Regulation 23. The Plan is further supported by the University's policy regarding the use of toxic substances in University facilities.

Toxic Substances Use on Campus; Fayetteville Policies and Procedures 727.1

The University of Arkansas is committed to the health and safety of its students, faculty and staff. It is recognized that during their work for the University, some people will be involved in activities that require the use of substances or materials that are hazardous or toxic in nature. The Environmental Health and Safety unit of the Physical Plant Department has prepared the UAF Chemical Hygiene plan. This document addresses the safe use of toxic substances in laboratories. In addition, it defines the minimum acceptable standard safety practices for execution of laboratory work for both research and teaching. The chemical hygiene plan is available from the EHS web page, http://new-www3.uark.edu/EHSATraining/DocumentPages/chp2008_1010.pdf and is the full statement of the UAF campus policy and procedures for handling toxic substances. January 25, 2002.

ROLES AND RESPONSIBILITIES

According to OSHA, The chief executive officer of the institution has ultimate responsibility for chemical hygiene within the institution and must, with other administrators, provide continuing support for institutional chemical hygiene. This support is provided by the TSC and by EH&S, specifically the Chemical Hygiene Officer (CHO), who is directly appointed by, and with a direct line of authority to the Chancellor or any member of the Chancellor's staff in matters relating to chemical safety. The CHO is responsible for assisting Principal Investigators, laboratory supervisors, and other

employees with implementation of appropriate chemical hygiene policies and practices. The CHO also is responsible for monitoring procurement, use, and disposal of chemicals used in the lab, overseeing a program for regular audits of laboratories and other units using chemicals, helping project directors develop precautions and adequate facilities for specific projects, knowing the current legal requirements concerning regulated substances, and for seeking ways to improve the chemical hygiene program

The Chemical Hygiene Plan is a product of EH&S. It is reviewed annually by the TSC and any appropriate revisions are made by EH&S. EH&S provides timely and relevant information regarding safety and regulatory requirements, conducts regular compliance inspections, and collects hazardous waste for disposal, and manages the 90-day hazardous waste accumulation facility. Implementation of this chemical hygiene program is mandatory and is designed to minimize exposures. The plan is to be a regular, continuing effort in academic teaching laboratories as well as in research programs.

The Principal Investigator (PI) has the overall responsibility for compliance with the Chemical Hygiene Plan in his or her laboratory. The PI must know the legal requirements applicable to his or her laboratory and must assure that:

- Laboratory workers and others entering laboratory know and follow chemical hygiene standard operating procedures (SOP).
- The hazardous waste satellite accumulation site(s) located in his or her area is properly managed.
- Appropriate laboratory attire is worn and that appropriate personal protective equipment is available.
- Appropriate training has been provided to all occupants of the laboratory.
- Unsafe conditions or inadequate facilities are reported to Facilities Management and/or EH&S.
- Accurate and timely chemical inventory records are maintained, and restricted quantities are not exceeded.
- Material Safety Data Sheets (MSDS) for all chemicals in the inventory are current and readily available at all times.

Individual laboratory workers are responsible for:

- Planning and conducting each operation in accordance with the SOP outlined in the Chemical Hygiene Plan.
- Wearing appropriate personal protective equipment including, but limited to, a lab coat, safety glasses, and appropriate shoes in the laboratory.
- Developing good laboratory hygiene habits.
- Promptly reporting unsafe behavior or conditions to the PI or to EH&S.

DESIGN REQUIREMENTS FOR LABORATORIES

The laboratory facility must have an appropriate general ventilation system with air intakes and exhausts located so as to avoid intake of contaminated air. Stockrooms and storerooms, in particular, must be well-ventilated. The general laboratory ventilation system must provide a source of air for breathing and for input to local ventilation devices. However, the general ventilation system, or building ventilation, should not be relied upon for protection from toxic substances released into the laboratory. The ventilations system should be balanced so that the laboratory air is continually replaced, preventing increase of air concentrations of toxic substances during the working day. The laboratories should be under negative pressure with respect to hallways and other non-laboratory areas; that is, there must be direct air flow into the laboratory from non-laboratory areas and out to the exterior of the building.

The laboratory must be equipped with appropriate laboratory hoods and sinks, and with safety equipment that includes plumbed in eyewash fountains and drench showers. A laboratory hood with 2.5 linear feet of hood space per person should be provided for every 2 workers if they spend most of their time working with chemicals. Each hood should have a continuous monitoring device for confirmation of adequate hood performance before use. If this is not possible, work with substances of unknown toxicity should be avoided or other types of local ventilation devices should be used, such ventilated storage cabinets, canopy hoods, snorkels, or glove boxes.

Each canopy hood and snorkel should have a separate exhaust duct. Exhaust air from glove boxes and isolation rooms should be passed through scrubbers or other treatment before release into the regular exhaust system. Cold rooms and warm rooms should have provisions for rapid escape and for escape in the event of electrical failure.

MAINTENANCE REQUIREMENTS FOR LABORATORIES

Equipment – Chemical-hygiene-related equipment, such as hoods, eyewashes, safety showers, should be continually appraised and should be modified if inadequate. These items of equipment undergo scheduled maintenance by Facilities Management, but there may be routine maintenance tasks that must be performed by the laboratory staff. For example, for sanitation reasons, the eyewashes must be flushed weekly. Work spaces must be kept clean and uncluttered.

Ventilation -- Any alteration of the ventilation system should be made only if thorough testing indicates that worker protection from airborne toxic substances will continue to be adequate. Four to twelve room air changes/hour is normally adequate general ventilation if local exhaust systems such as hoods are used as the primary method of control. General air flow should not be turbulent and should be relatively uniform throughout the

laboratory, with no high velocity or static areas. Airflow into and within fume hoods should not be excessively turbulent, and hood face velocity should be adequate (100 cfu/min +/- 20%). Ventilation should be evaluated, qualitatively and quantitatively, upon installation, regularly monitored and maintained, and reevaluated whenever a change in local ventilation devices is made.

Housekeeping – Benches and other work areas should be kept clean. Floors should be cleaned regularly. Formal housekeeping and chemical hygiene inspections are performed quarterly by EH&S. Informal inspections by the laboratory supervisor should be performed daily. Stairways and hallways are not to be used as storage areas. Access to exits, emergency equipment, and utility controls must never be blocked.

GENERAL STANDARD OPERATING PROCEDURES

These procedures are general laboratory procedures that should be followed in all laboratories. Enforcement of these procedures is the responsibility of the PI or his or her designated laboratory supervisor. The PI is also responsible for ensuring that the work conducted and its scale must be appropriate to the physical facilities available, particularly with respect to the quality of ventilation.

Reporting accidents - Accidents with personal injury must be reported to the laboratory supervisor on the day in which the injury occurred.

Immediate action in the event of a spill – First aid for any exposed personnel is a priority. For eye contact, promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention. If someone has ingested something, encourage the victim to drink large amounts of water. Skin contact requires prompt flushing of the affected area with water and removal of any contaminated clothing. If symptoms persist after washing, seek medical attention.

Spill Cleanup – Small spills must be cleaned up immediately and under the supervision of the laboratory supervisor, using a readily accessible spill kit. In the event of a larger spill, call EH&S at 575-3597. If conditions are thought to present an immediate danger to life and health, vacate the area and call 911.

Emergency Response – A written, laboratory specific emergency plan must be established and communicated to all personnel. The plan should include procedures for ventilation failure, evacuation of the laboratory, first aid and securing medical care, and reporting. Regular laboratory safety meetings and drills are recommended. There must be procedures for alerting all personnel in the laboratory, including areas such as growth chambers and cold rooms. Contact EH&S professionals at 575-5448 for assistance in developing such a plan.

Minimize exposure - Minimize exposure by careful use of chemicals and by good housekeeping. Key provisions should include a prompt cleanup of equipment and

work area, as well as the washing of hands prior to leaving the laboratory. Almost all laboratory chemicals involve some degree of hazard. Do not underestimate risk. Exposure should be minimized, even for substances not known to be hazardous. Some chemicals involve particular hazards, and for these, special precautions may be necessary. Always assume that any mixture of chemicals is more toxic than its most toxic component. The Permissible Exposure Limits (PEL) of OSHA and the Threshold Limit Values (TLV) of the American Conference of Governmental Industrial Hygienists should not be exceeded.

Avoid "routine" exposure by developing and encouraging safe habits; avoid unnecessary exposure to chemicals by any route. Do not smell or taste chemicals. Vent any apparatus that may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices. Inspect gloves and test glove boxes or other containment equipment before use. Be especially careful of releasing toxic substances in cold rooms and warm rooms, since these have contained recirculated atmospheres.

Knowledge of the chemicals used - Before a substance is received, information on proper handling, storage, and disposal should be made known to those who will be involved. No container should be accepted without an adequate identifying label. Chemical names and labels on each container should be carefully checked and double-checked prior to use. All chemical use should be preceded by knowledge of the chemical characteristics and its potential hazards.

Chemical Storage – Toxic substances must be segregated in a well-identified area with local exhaust ventilation. Chemicals that are highly toxic or reactive, or chemicals in containers that have been opened, should be in unbreakable secondary containers. Stored chemicals should be examined at least once a semester for expiration date, deterioration, and container integrity. Stockrooms and storerooms should not be used as preparation or repackaging areas. They should be open only during normal working hours, and should be controlled by one responsible individual. Amounts kept in inventory should be as small as practical. Storage on bench tops and in hoods is inadvisable. Exposure to heat or direct sunlight should be avoided. Periodic inventories should be conducted, with unneeded items being discarded or returned to the storeroom/stockroom.

Food, Drinking, Smoking, Cosmetics - Eating, drinking, smoking, or the applying of cosmetics are not permitted in any laboratory. All food and drink materials, -- e.g., coffee cups, glasses -- are to be left outside the laboratory.

Horseplay - is not permitted.

Pipetting by mouth suction - is not permitted.

Appropriate personal apparel - must be worn in the laboratory. In particular, loose sleeved shirts and blouses should be avoided, as should sandals or open footwear of any type.

Work area - Good housekeeping is of paramount importance for maintaining a safe laboratory environment. Lab benches and work spaces must be kept clean and neat. Items such as coats and backpacks must be stored appropriately. Individual employee/student responsibility for maintaining a safe and clean work area should be emphasized by the PI or laboratory supervisor.

Eye protection - must be worn in laboratories at all times. Contact lenses are not to be worn in laboratories. Goggles or safety glasses with splash shields are required.

Careful planning - must precede all laboratory operations.

Unattended operations - require careful prior planning and consideration and must have prior approval of the PI or laboratory supervisor.

Containment - When chemicals are hand carried, the container should be placed in a secondary container or bucket. Freight-only elevators should be used if possible. Provisions also must be made for secondary containment in the event of spills or container breakage.

Laboratory fume hoods – All laboratory facilities must be engineered to provide adequate ventilation. Containment of airborne substances is best prevented by use of fume hoods or similar EH&S approved ventilation devices. Fume hoods must be used for all operations that have the potential to release fumes, gases, or volatile solvent vapors in excess of recommended exposure levels.

Laboratory and teaching assistants - are to be instructed in laboratory safety practices.

Appropriate safety precautions - are to be stressed in laboratory lectures whenever specific hazards are anticipated.

Sink/sewer disposal - of laboratory waste is essential. No sink/sewer disposal of chemicals is permitted without explicit permission of the PI or laboratory supervisor. A list of chemicals approved for sanitary sewer disposal is included as Appendix II. Notify EH&S promptly if there is a possibility that a chemical not listed for sewer disposal has been put down the sink.

Storage of flammable solvents - in the laboratories is to be kept to a minimum and such solvents are to be stored in a flammable cabinet. See Appendix III for specific information regarding the handling of flammable and combustible liquids.

Compressed gas cylinders - used in the laboratory are to be secured (chained or strapped) at all times. When cylinders are being transported, they must be secured and the protective caps must be in place. For additional information, see Appendix III.

Acids and bases - are to be stored separately in clearly labeled containers.

Hydrides and active metals - will be stored separately.

All hazardous conditions - are to be corrected immediately upon discovery.

Teaching labs - must be supervised at all times. If the Teaching Assistant (TA) must leave, the lab must be left under the supervision of a qualified designee.

No solitary work - is permitted in laboratories. A "buddy system" will be used unless written permission is given by the PI or laboratory supervisor. Permission will be required for after hours work,

Work with corrosive agents - such as acids and bases must be conducted with particular care to avoid skin and eye contact.

AIC powered laboratory equipment – must be equipped with safety grounds and three prong plugs unless internally grounded by the manufacturer.

Laboratory operations - that have the potential to create fires or explosions require special procedures and safety equipment. Such operations must have prior approval of the laboratory supervisor. Safety equipment such as fire extinguishers, shields and safety showers must be checked prior to such operations.

Low temperature operations - such as procedures using dry ice or liquid gas require special care to avoid frostbite, container rupture, or condensation of liquid oxygen. Glass Dewar flasks should be taped to avoid flying glass resulting from failure. Such operations require prior approval of the PI or laboratory supervisor.

Pressurized or vacuum operations - often require special protective equipment such as shielding. Such operations require prior approval of PI or laboratory supervisor.

Chemicals with limited shelf life – may require special handling or storage procedures. Examples include solvents that form peroxides, such as diethyl ether; chemicals that decompose upon storage to form potentially dangerous pressures, such as formic acid; and chemicals that become unstable upon storage, such as picric acid.

Special hazards – Some chemicals pose special hazards. The effects of exposure to these chemicals may not be immediately or readily apparent, but may nevertheless, serious. Examples of such substances include allergens and embryotoxins. Allergens (examples: diazomethane, isocyanates, bichromates) require the use of suitable gloves to prevent hand contact with known allergens or substances of unknown allergenic activity.

Examples of embryotoxins include organomercurials, lead compounds, and formamide. Women of childbearing age should handle these substances only in a hood whose satisfactory performance has been confirmed, using appropriate protective apparel (especially gloves) to prevent skin contact. Some substances are chemicals of high chronic toxicity. Examples of these substances include dimethylmercury and nickel carbonyl, benzo-a-pyrene, N-nitrosodiethylamine, many chemicals classified as human carcinogens. Access to these chemicals should be controlled, and all transfers and work with these substances should take place in a "controlled area", with 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. These chemicals require a plan for use and disposal of these materials, and require express approval of the laboratory supervisor. The approval of the TSC or the CHO may also be required. Contact EH&S for additional information.

Working with animals and chemicals of high chronic toxicity – For large scale studies involving animals and toxic chemicals, special facilities with restricted access are preferable. Whenever 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. Devise procedures that 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). (Remember that such projects require review by the Institutional Animal Care and Use Committee [IACUC]). Wear plastic or rubber gloves and fully buttoned laboratory coat or jumpsuit when working in the animal room. If a situation exists where there is incomplete suppression of aerosols, other apparel and equipment (e.g., shoe and head coverings, respirator) should be worn. Contact EH&S for assistance with waste disposal.

Chemical inventory – The kinds and amounts of chemicals in the laboratory must be documented and the record kept current. The OSHA Laboratory Standard requires that an itemized inventory be available for each laboratory. The PI is responsible for maintaining an accurate and current list of materials in his or her laboratory. It is recommended that each department maintain a separate copy of the inventory list in the departmental office.

Material Safety Data Sheets – MSDS are required for each and every chemical in the laboratory and must be readily accessible on site for all employees at all times. The PI has responsibility for maintaining accessibility to current MSDS. Electronic MSDS are permissible as long as they are readily accessible to all employees at any time, without restriction. However, merely referring personnel to the internet for obtaining MSDS is insufficient and is **not** an acceptable alternative. EH&S also has an extensive hard copy file of MSDS in their reference library.

Environmental monitoring – Regular instrumental monitoring of airborne concentrations is not usually justified or practical in University laboratories, but may be appropriate when testing or redesigning hoods or other ventilation devices, or when a

highly toxic substance is stored or used regularly. Please consult the CHO for advice or assistance.

Contact information - Signs must be in place for adequate notification of emergency responders, including EH&S, the PI or laboratory supervisor, responsible experimenter, and backup personnel.

All persons in the laboratory should remember these basics rules

1. Think in terms of safe practice continuously.
2. Be familiar with every step of the job you are going to do.
3. Check each apparatus item and chemical at least twice before proceeding.
4. Maintain an awareness of the danger in handling chemicals
5. Remember that the safe way is the best way to accomplish any job.
6. Guard your own safety and that of co-workers.
7. Prepare your response to possible accidents by forethought.
8. Act promptly and in a calm manner when confronted with an emergency.
9. Suggest a safe practice immediately when you see the need for one.
10. Be certain that your laboratory has the appropriate safety equipment.

MANAGEMENT PRACTICES

Principal Investigators and laboratory supervisors have the responsibility for maintaining safe standard operating procedures and for making specific revisions the procedures as appropriate and necessary. Principal Investigators are defined as the faculty members who are responsible for the research laboratories and specific laboratory sections. Laboratory supervisors may be senior staff personnel who report directly to the PI.

Management practices should take into consideration the following in order to prevent or minimize exposure to chemicals:

General principles - Many chemicals, because of concentration, toxicity, flammability, carcinogenicity, or other characteristics, are potential health hazards or safety. The intent of the Chemical Hygiene Plan is to provide guidelines for handling and using chemicals without causing harm to the user, other personnel, or to the laboratory environment. Any revision or deviation from the SOP should reflect the same intention.

Minimize exposure – Exposure should be minimized, even for substances with no known significant hazard. When working with substances that are known to be

hazardous, special precautions must be taken.

Do not underestimate risk - Always assume that a mixture presents at least all the hazards of its components and that all substances of unknown toxicity are toxic.

Assess employee and student exposure - Maintain employee and student exposure below the OSHA Permissible Exposure Limits (PEL) and other applicable exposure limits by informed assessment of exposure potential and monitoring of the workplace exposure as appropriate. (The PI or laboratory supervisor may contact EH&S at 575-5448 for assistance with exposure monitoring.)

Apply engineering controls - Engineering controls and personal protective equipment should be used to minimize exposure. Control methods, such as laboratory hoods, local exhaust ventilation, enclosures, wet methods, etc., should be applied in preference to primarily depending on personal protective equipment such as respirators.

Chemical inventory - Chemical inventories should be kept to a minimum in working laboratories. These minimal inventories must be stored in a safe manner using chemical safety cabinets for flammable chemicals and acid cabinets (or other appropriate storage such as secondary containment trays lined with clay absorbent) for corrosives. Chemicals must be segregated by chemical characteristics to avoid incompatibilities. Strong acids and bases must not be stored adjacent to each other. For example, ammonium hydroxide is not to be stored adjacent to acetic acid or hydrochloric acid. Nitric acid (an oxidizer) must not be stored adjacent to glacial acetic acid (a flammable). Alphabetical storage sequences are not adequate if chemical characteristics are ignored.

Hazardous chemical inventory – In the event of an emergency, it is imperative that emergency responders know what hazards they may encounter. Therefore, the PI or laboratory supervisor must maintain a current hazardous chemical inventory list in the laboratory. This hazardous chemical list should be reviewed and updated, at a minimum, each semester or as necessary for chemical removal and new chemical additions. This inventory must be posted in the laboratory, near the door, and a copy should be kept on file in the departmental office. In addition, copies should be forwarded to EH&S.

Chemical containers - All chemical containers must be kept capped or lidded at all times, except when chemicals are actually being transferred. All chemical containers must be in good condition, not leaking, and accurately and completely labeled with respect to contents. Chemical symbols are not acceptable on labels. The identity of the chemical(s) must be spelled out.

Adequate ventilation - Adequate ventilation is essential for minimizing exposure. It is the responsibility of the PI or laboratory supervisor to terminate laboratory operations if ventilation is judged to be inadequate for any reason such as equipment malfunction or

accidental spillage. Facilities Maintenance performs maintenance on fume hoods once a quarter, making appropriate repairs as needed. Each hood is flow-tested before it is returned to service. However, any known or suspected malfunction of a fume hood should be promptly reported to the Facilities Management Service Center at 575-5050. The following guidelines should govern the use of fume hoods and should be posted on each hood:

- ***Confirm that hood is operational.*** If hood is equipped with a local on/off switch, make sure switch is in the on position. Check the air flow gauge if hood is so equipped. If not, attach a telltale (a one inch by six inch piece of crepe paper or tissue attached to the bottom of the sash). The telltale should be noticeably pulled toward the back of the hood.
- ***Set up work at least six inches from the face opening.*** This will avoid turbulence at the sash edge and provide greater protection.
- ***Separate and elevate each instrument inside hood.*** Use blocks or racks to elevate equipment one to two inches off the hood deck surface so that air can easily flow around all apparatus with no disruption.
- ***Lower sash to the optimum height.*** The sash will then act as a physical barrier in the event of an unplanned incident in the hood. Optimum height for most University fume hoods is set at sixteen inches.
- ***Keep hood storage to an absolute minimum.*** Excess materials in the hood disrupt airflow and can act as a barrier or cause airflow to bounce back across the face of the hood. Keep the back bottom slot clear at all times as it serves as an exhaust port for fumes and heat generated near the surface.
- ***Minimize foot traffic near and around the hood.*** Persons walking past the hood can create competing air currents.
- ***Keep laboratory doors closed.*** Cross drafts due to open doors or the use of fans should be eliminated.
- ***Use extreme caution with ignition sources inside a fume hood.*** Ignition sources, (e.g., electrical connections and equipment, hot plates, open flames) will ignite flammable vapors or explosive particles from materials inside the hood. All electrical equipment used inside a fume hood must be designed or certified as intrinsically safe unless it can be absolutely established (and enforced) that flammable or explosive materials will not be used in a particular hood.
- ***Persons must never put their heads inside a hood that is in use.*** The plane of the sash is a boundary that should not be crossed except to set up or dismantle equipment.
- ***Clean up spills as soon as possible.***
- ***Lower the sash completely*** when the hood is unattended.
- ***Do not dismantle or modify the hood or exhaust system in any way.***
- ***Promptly report air flow and/or structural problems with the hood*** to the Facilities Management Service Desk at 5-5050.
- ***Never use a hood that has been tagged out of service.***

Food & beverages - No food or beverages intended for human consumption may be stored or consumed in the laboratory at any time. Likewise, the application of cosmetics in the laboratory is prohibited. If possible, students and/or staff should be provided a place outside the laboratory for eating and drinking.

Contact lenses -The wearing of contact lenses while working in the laboratory is strongly discouraged. Particles or caustic chemicals can become trapped under the lens, causing physical damage or chemical burns to the cornea. The gas-permeable type contact lens may absorb vapors that interact with eye lens moisture to cause a burn.

Personal Protective Equipment - Routine laboratory personal protective equipment should include protective eyewear. Goggles are preferable, as they provide a seal around the eye, protecting it from splashes. It should be noted that pending OSHA regulations require eye protection to include side shields, Ordinary glasses or safety glasses without side shields would not be adequate under the proposed regulations. Polycarbonate glasses should be worn if the work being performed involves the risk of impact to the eye. Gloves should be worn for work with strong corrosives or with acutely toxic chemicals. Nitrile gloves offer greater protection from chemicals and are more puncture resistant than latex. Special procedures may require additional or special protective equipment.

Eye Wash Stations & Drench Showers - Eye wash stations and emergency drench showers are necessary in order to minimize exposures in the event of an emergency. Eye wash stations must be flushed weekly to maintain them in a sanitary condition. Facilities Management maintenance personnel perform monthly testing of safety showers and eye wash stations. However the weekly flushing of the eye wash station is the responsibility of the laboratory and must be documented. Access to both eyewash stations and safety showers must be free and unobstructed at all times. In an emergency, personnel must be able to access the stations within 10 seconds.

Air Quality Monitoring - Air quality monitoring will be performed if the laboratory supervisors report conditions that might lead to excessive exposure. This air quality monitoring will be performed by qualified personnel, either from EH&S or by an outside consultant.

SIGNS AND LABELS

Appropriate signage is required for all hazard areas, and all chemicals and waste containers must be appropriately labeled. Questions regarding labeling requirements should be addressed to the Chemical Hygiene Officer in EH&S (575-5448).

Laboratory Entrances - All laboratory entry doors must be posted with an NFPA diamond, stating the classes of hazardous chemicals used or stored in the laboratory. If there are any other hazards in the laboratory, e.g.,

lasers, magnetic field, radiation, these also must be listed on the door in accordance with the regulations pertaining to them. In addition, there must be a placard listing the names and telephone numbers of the person(s) to be contacted in the event of an emergency.

"Eye Protection Required Beyond This Point" (or equivalent) must be posted at the entry to all laboratories and chemical storage areas. Protective eyewear, in the form of splash goggles or safety glasses with side shields, is required at all times in laboratories or chemical storage areas.

Bottles & Containers - All bottles or other containers of chemicals in the laboratory work or storage areas shall be labeled with the NFPA standard warning label, or similar warning label, so that the potential hazard is obvious. Labels must be maintained in a legible condition. Labeling and maintenance of the labeling are the responsibility of the laboratory supervisor.

Waste Accumulation Areas – Waste accumulation areas in laboratories are considered to be satellite accumulation areas of the University’s 90-day hazardous waste accumulation and storage area, and are strictly regulated by the Arkansas Department of Environmental Quality (ADEQ). Each laboratory generating hazardous waste must designate an appropriate area as a satellite accumulation area and must label the area as such (labels available from EH&S). Waste accumulation must be restricted and limited to these areas, and not stored in any other area in the laboratory. The location of satellite accumulation area must not be changed without prior notification to EH&S and approval of the Chemical Hygiene Officer.

Waste Accumulation Containers - All hazardous waste accumulation containers must be specifically labeled with the words “HAZARDOUS WASTE” and with the identity of the contents. The names of the chemicals must be spelled out. Chemical symbols or abbreviations are not acceptable. When the container is full, it must be labeled with the final fill date. EH&S must be notified, so that the container is picked up and placed in the 90-day accumulation facility within three days of being full. It is important to remember to leave sufficient head-space in filled waste containers to avoid breakage due to excess pressure.

Emergency Contact Information – Emergency telephone numbers of emergency personnel/facilities, supervisors, and laboratory workers must be posted near the telephone. Emergency response agencies are best contacted by dialing 911. This call will be forwarded both to the appropriate responder for the City of Fayetteville, and to the University Police Department (UAPD).

Warnings – Signs must be posted designating safety showers, eyewash stations, other safety and first aid equipment, exits, and for areas where food and beverage consumption and storage are permitted. Warnings must be posted in areas or near equipment where special or unusual hazards exist.

Lockout/Tagout – It will occasionally be necessary for EH&S to take a fume hood or other piece of equipment out of service for maintenance or safety reasons. When this happens, a tag will be placed on the equipment advising users that the equipment is out of service. **DO NOT REMOVE THESE TAGS. DO NOT USE EQUIPMENT THAT HAS BEEN TAGGED OUT.** EH&S will remove the tags when the equipment is ready for use,

TRAINING

Documentation of all employee and student training sessions must be forwarded to EH&S at 521 South Razorback Road.

Each employee covered under this Chemical Hygiene Plan must be provided with information and training concerning the hazards of the chemicals present in his or her work areas. Each employee of the University who participates in the required New Employee Orientation receives the basic Hazard Communication Training (HAZCOM or “Right to Know” Training) mandated by OSHA. The training must be provided at the time of initial assignment and prior to any new assignments involving different exposure situations. Additional, job-specific training may be required for persons whose duties involve particular hazards, such as those associated with laboratories. Providing and documenting this training is the responsibility of the laboratory supervisor. Documentation of the training, which must include the employee’s start date, must be kept in the laboratory and a copy must be provided to EH&S.

Refresher training is required and is usually performed annually. The responsibility for providing and documenting the refresher training is the responsibility of the Principal Investigator. Occupational Safety Coordinators from EH&S are available upon request to provide information and assistance. Copies of the training materials and also copies of the documentation (sign-in sheets, etc.) must be forwarded to EH&S.

Student laboratory assistants will be provided training prior to their supervision of other students. This training must be provided and documented at the beginning of their employment by their laboratory supervisor (course instructor

Custodians and other Facilities Management personnel who work in laboratory areas must be provided site-specific training under the Hazardous Communication Standard. This training is available from EH&S, but arranging for and documenting the training is the responsibility of the Supervisor .

Outside contractors, or university workers from such areas as Facilities Management must be informed of the hazards to which they might be exposed while working in the laboratory environment. The department that contracts for the work has the responsibility for informing workers of these hazards and for providing any associated training that will

be site-and job-specific.

Site-specific training must include, at a minimum, the following information:

- contents and availability of the Chemical Hygiene Plan
- Permissible Exposure Limits (PEL) for OSHA regulated substances and recommended exposure limits for other hazardous chemicals where PEL do not exist.
- symptoms associated with exposure to the hazardous chemicals used in the laboratory
- physical properties and health hazards of chemicals in the work area
- location and availability of Material Safety Data Sheets (MSDS)
- methods and observations that may be used to detect the presence or release of a hazardous chemical
- measures that employees and students can take to protect themselves from these hazards, including specifics such as appropriate work practices, emergency procedures, and personal protective equipment to be used.

In addition to the hazard communication training, all faculty, staff, and students who manage or handle hazardous waste must have documented Hazardous Waste Generators' Training. The laboratory supervisor is responsible for providing this training to employees and students. The training must be provided and documented at the time of initial employment and annually thereafter. At a minimum, the training must include basic RCRA requirements for:

- Storage requirements for hazardous waste; e.g. closing containers, head space, etc.
- Labeling of waste containers
- Choosing appropriate containers
- Compatibility of wastes
- Holding time
- Classification and sorting
- Appropriate disposal procedures

Assistance with this training is available from EH&S.

MEDICAL SURVEILLANCE

The OSHA Laboratory Standard [29CFR 1910.1450 (g)] mandates that employers provide employees an opportunity for necessary medical attention, examinations, and follow-up examinations at the physician's discretion in the event that:

- an employee develops symptoms associated with a hazardous chemical to which they may have been exposed
- exposure monitoring reveals a persistent exposure level above the OSHA

action level, or PEL for OSHA regulated substances

- an event takes place in the work area (such as a spill, leak, explosion or other occurrence) that results in the likelihood of a hazardous exposure.

The laboratory supervisor must provide the examining physician the following:

- identity of the hazardous chemical to which employee may have been exposed
- description of conditions of exposure, including exposure date, if available
- description of the symptoms of exposure, if any, that the employee is experiencing
- A copy of the relevant MSDS

The laboratory supervisor should request and obtain a written opinion from the examining physician including:

- results of examination and associated tests
- recommendations for further medical follow-up
- any medical condition revealed that may place the employee at increased risk as the result of a chemical exposure
- a statement that the employee has been informed by the physician of the results of the examination or consultation and told of any medical conditions that may require additional examination or treatment

The physician's statement will not include specific findings and/or diagnoses that are unrelated to occupational exposure. Copies of all documentation surrounding the event should be provided to EH&S.

RECORD KEEPING

Accident records must be written and retained. All accidents are to be promptly reported to the laboratory supervisor. The supervisor will document the incident and forward a copy to EH&S.

Chemical Hygiene Plan records should document that the facilities and precautions were compatible with current knowledge and regulations. Inventory and usage records for

must be kept for high-risk substances. Medical records will be retained by the institution in accordance with the requirements of state and federal regulations .

APPENDIX I

Chemical Hygiene at the 90-day Accumulation Facility

The University has a state-of-the-art facility (EHSS) for holding hazardous wastes picked up from the satellite accumulation areas, pending shipping for disposal at an appropriate facility. The Office of Environmental Health and Safety has Standard Operating Procedures (SOP) for managing hazardous wastes.

For the Generator and Satellite Accumulation Areas:

1. Ensure controlled access to the hazardous waste accumulation area. The area should be locked when there is no one in the laboratory or work area.
2. All hazardous waste accumulation areas must be identified as such with a sign stating that the area is for the accumulation of hazardous waste materials, and containers must be correctly labeled and kept closed. These signs are available from the Office of Environmental Health and Safety (EH&S).
3. All hazardous waste containers must be labeled with the words “Hazardous Waste” with the chemical(s) in the container listed on the label.
4. The amount of hazardous waste permitted to be stored in the satellite accumulation areas is limited to 55 gallons. (Amount of Extremely Hazardous Waste is limited to one quart.) Operations expected to generate more than these amounts must be reported to EH&S immediately and the date the waste exceeded these amounts must be recorded. Such excess amounts of waste must be removed to the 90-day storage facility within three days.
5. When the container is full, a hazardous waste pickup request must be promptly filled out and sent to the EH&S office. Request forms are available on the EH&S website.
6. All chemicals shall be separated with respect to compatibility.
 - a. Acids and bases should not be stored together.
 - b. Flammables and oxidizers should not be stored together.
7. All flammable materials must be stored in a “FLAMMABLES” cabinet.
8. All containers of chemicals must be labeled with the name of the chemical in the containers. (This means even water bottles containing water.) Products with trade names must be kept in the original labeled container.
9. All containers of chemicals must be kept closed at all times, except when removing materials or (in the case of hazardous waste containers) adding waste. Be sure to leave adequate head space in the container (a minimum of 2-3 inches is recommended for most containers).

10. Emergency phone numbers must be posted by the telephone and at the door. If there is not a phone in the area where hazardous materials are used or stored, the emergency phone numbers must be posted at the door.
11. In areas that contain more than one hazardous chemical, a chemical list must be available at all times. Material Safety Data Sheets (MSDS) must be kept on site and available upon request. The areas that contain hazardous chemicals must have a hazardous chemical list posted on or near the outside door of the area that the chemicals are stored.
12. All personnel working in an area that could generate hazardous waste must take the “Hazardous Waste Generators Training”. The training and the test are on the EH&S website. The training must be updated annually.
13. All personnel handling hazardous materials must wear the appropriate personnel protective equipment; e.g., closed-toed shoes, lab coats, gloves, eye protection, etc.
14. Spills should be avoided, but if they do occur, every effort should be made to contain them. A spill kit must be readily available in each area. Small spills may be cleaned up by the generator; larger spills should be reported to EH&S. In the event of a catastrophic release posing an immediate threat to human health or the environment, call 911.

To dispose of hazardous waste:

15. Go to the Environmental Health and Safety Website, hazardous waste disposal page:
<http://new-www3.uark.edu/EHSATraining/HazWasteDisposal.aspx>
and follow the instructions on the page.
16. All hazardous waste containers must be appropriately labeled as the their contents and starting date of accumulation. For your convenience, EH&S is providing adhesive labels. ALL waste containers must be labeled and must be kept completely closed (no open containers; no funnels left in containers) at all times, except when adding waste. All items for disposal MUST be listed on the Hazardous Materials Disposal Form.
17. For additional information, consult the Chemical Hygiene Plan or call EH&S at 5-5448.

For EH&S and the 90-day Facility:

1. The faxed waste pickup request is received by the Office Clerk in EH&S and given to a staff member.

2. EH&S personnel then pick up the waste from the satellite accumulation site, making sure that all items are appropriately labeled and in suitable, securely closed containers.
3. EH&S personnel record the 90-day accumulation start date on each container label and sign or initial in the space provided.
4. Hazardous waste in amounts exceeding the 55-gallon limit (one quart for Extremely Hazardous Waste) must be removed from the satellite accumulation areas within three days of exceeding the limit. The date was exceeded must be recorded on the container, along with the 90-day accumulation start date.
5. The request form is checked for completeness and accuracy, and the items are checked make sure that all items to be picked up are listed on the request form and that all items listed are, in fact, ready for pick up. This information on the form must be correct, as this request form now becomes the inventory for the 90-day storage facility.
6. Items are placed in secondary containment and transported to the EH&S 90-day storage facility (EHSS). After unlocking and logging in, EH&S personnel unload the items and sort them by type into the appropriate storage locker. Any unknown items are characterized at this time, using the HAZCAT kit, after which they are labeled.
7. The faxed request/inventory form is placed in a three-ring binder kept in a locked metal cabinet on the EHSS dock.
8. At the end of every quarter (more often, if necessary), the items are picked up by a contractor for transport and disposal at an approved facility. A record of the shipment is placed in the three-ring binder with the inventory sheets. The shipping manifests are sent to the EH&S office where they are place in the files.
9. For each quarter, there is a cumulative set of inventory sheets, accompanied by a shipping record. Periodically, the Records Manager for EH&S removes the inventory sheets from the binder and places them in the files in the EH&S office.
10. At any given time, it is possible to look in the binder and tell exactly what is in currently in the storage facility, where it came from, when it was picked up, when the last off-site shipment occurred, and what was shipped.
11. EHSS is inspected weekly by an EH&S staff member, using a checklist form, and the inspections are documented in a log kept on site at EHSS. Copies of the inspection forms are filed in EH&S.

12. Safety and security are to be maintained at EHSS at all times. Only EH&S personnel are authorized to enter the locked facility. Personnel must log in when entering the facility and must wear safety goggles.
13. All chemical storage rooms are equipped with vapor monitors and ventilation fans that are programmed to activate when the lights in the room are turned on. Personnel must not enter a room without first turning on the light.
14. Safety equipment (shower and eyewash) must be inspected and tested weekly. These inspections are likewise documented.
15. EHSS is equipped with an alarm system that reports to University Police (UAPD). UAPD dispatch maintains a contact list for EH&S that includes the contact information for the Emergency Coordinator and the Chemical Hygiene Officer.
16. All spills resulting in release of hazardous materials must immediately be reported to the Emergency Coordinator and to the Chemical Hygiene Officer.

SOP for Weekly Inspection of the EHS Storage Facility (EHSS)

EHSS is inspected *weekly* according to the following SOP:

1. Unlock the gate.
2. Go to the Records Cabinet, unlock it and get a copy of the Weekly Compliance Inspection Form.
3. Review the Log Book, to ensure that everyone entering the building has logged in.
4. Log in your Visit to the Hazardous Waste Storage Building, with your name, date and time of your visit, and the reason for the visit.
5. Check each of the doors to ensure that they are all locked, and secure.
6. Check the Fire Extinguishers to see that they are being inspected monthly, and that they are properly serviced. Take each extinguisher off of their hook, check the pressure, and do a quick check of the extinguisher as a whole. Then turn the extinguisher over a couple of times to break up the dry chemical. Then date and sign the inspection tag, with any comments necessary. Place the extinguisher back on it proper hook.
7. Take a look at the dock, looking at the overall neatness, and storage. Is it cluttered, or have a lot of trash?
8. Unlock the Supply Cabinet, and check to see if all of the PPE is available, and in good condition.
9. Unlock each of the storage rooms, and check each of the rooms. Check the containers to ensure that there is no leakage, and in good condition. Be certain that all of the containers are properly stored and closed. Check to see if any of the

- containers are overfilled. Check to see that all of the waste containers are properly labeled.
10. Make sure that each container is labeled with the 90-day accumulation start date and that the 90-day storage limit has not been exceeded. (Any item found to have been in storage for more than 80 days is to be immediately reported to the Chemical Hygiene Officer to assure timely disposal.)
 11. Relock all of the storage room doors.
 12. Note any violations on the Inspection Sheet, and add any necessary additional comments.
 13. Sign the Weekly Inspection Form, and put it in the 3 Ring Binder labeled, Weekly Inspections.
 14. Check the Eye Wash and Safety Shower. Log in the results of the Inspection of the Eye Wash and Safety Shower.
 15. Check the Waste Log Book to ensure that all of the Waste has been properly logged into the Storage Facility.
 16. Relock the Records Cabinet, and the Supply Cabinet.
 17. Double Check to make certain that all of the Storage Room Doors are Locked and Secure.
 18. Relock the Gate as you leave the Building.

Universal Waste – There are also SOP for the handling and disposal of fluorescent lamps as Universal Waste

Preparation

- Wear appropriate gloves (e.g., leather) and approved eye protection when handling used lamps.
- Use the boxes provided for the collection of used lamps. Additional boxes are available from Razorback Recycling. Boxes the new lamps were shipped in can also be used as long as the flaps can be folded shut and the packing material (“egg crate”) has been removed.

Packaging and Storing Lamps

- Sort the lamps by the size and type. Incandescent bulbs are mercury-free and should be placed in the trash.
- Do not tape bulbs together, or they will be rejected.
- The box containing used lamps must be folded or taped shut *except* when bulbs are being added to it.
- Affix a “Universal Waste” label on the box/ fiber drum before placing the first lamp in it. This label must be readily visible (e.g., to inspectors) without moving the box/drum.
- Where ever possible, place the empty/filling lamp box at a 30-45 degree angle – this allows the maximum number of bulbs to be layered in the box.

- Use a safety chain or other restraint so boxes don't fall.
- Store boxes in a dry, secured area.
- When the lamp container is full, inventory the contents and write this information on the "Universal Waste" label.

Packaging Broken Lamps

- Broken lamps are not Universal Wastes and require alternate labeling and packaging. EHS will provide a metal drum with a plastic liner for broken lamps. Broken lamps are Hazardous Wastes. **Do not throw them into the trash.**
- Place a Hazardous Materials Label (HML) on the drum before placing the first broken lamp in it. The label must read: HAZARDOUS WASTE – CONTAINS MERCURY.
- **This drum must be kept closed and latched at all times except when broken lamps are being added to it.**
- When the drum is full, submit a properly completed Hazardous Waste Pick-up Request Form (available on the EH&S web site).
- Because broken lamps are hazardous waste, personnel who handle or dispose of fluorescent lamps are required to take and document the basic Hazardous Waste Generator's training, available on-line from the EH&S web site. A passing grade of 100% is required on the quiz.

Cleaning up Broken Lamps

Try and avoid breaking bulbs as mercury will be released into the atmosphere. But, if a bulb does break, follow this procedure:

- Mercury may be bound to the broken glass and powder. Keep people away from breakage area so that the mercury-containing powder is not tracked into other areas.
- Ventilate the area for 15 minutes, and keep the area well ventilated. This allows mercury vapors to dissipate.
- Assemble necessary supplies: latex gloves, tweezers, tape and a puncture resistant (e.g., plastic), sealable container.
- Wearing the gloves, carefully pick up any broken glass and place in puncture resistant container. Tweezers can be used to safely pick up broken glass. Tape can be used to pick up small pieces of glass and powder residue left on spill surface.
- Use two pieces of cardboard to push together remaining powder and fragments of glass. Finish clean up by sweeping if necessary.
- Important: **Do Not Vacuum!!** Dust will be dispersed into the air and mercury residue in the vacuum will be heated and vaporized when the vacuum is used again.

- After clean up is complete, placed contaminated clean-up materials, along with any other materials that came in contact with the mercury powder into the puncture resistant container and seal it shut with tape.
- Dispose of container in drum as described above.
- FOR QUESTIONS OR ASSISTANCE, PLEASE CALL EH&S AT 575-5448.

Spills and Releases of Hazardous Materials at EHSS

The University of Arkansas 90-day hazardous materials accumulation facility (ENSS) was designed and built to contain spills and prevent releases. There are four levels of spill containment for items placed in the facility:

- Primary containers of materials that are subject to spilling are placed within some kind of secondary container when they are checked into the facility. The secondary container may consist of a polypropylene tray or pan, or for larger items, a drum pallet.
- Tertiary containment is provided by the storage rooms themselves. Special containment features include Neoprene dams inside all walls and partitions to prevent spills from spreading from one room to another, and an impervious, chemically resistant epoxy coating on the floors, extending to a height of six inches up the walls of the storage rooms.
- The fourth level of containment consists of a concrete curb running the length of the dock area to help confine spills and releases to ENSS, should they occur.

The building is climate controlled and equipped with a sprinkler system. All electrical devices are explosion proof. The chemical storage rooms are equipped with ventilation fans that come on when the lights in the rooms are turned on. The rooms are also equipped with chemical sensors that activate the ventilating fans when vapors begin to accumulate in the rooms. The fans in the rooms containing volatile chemicals are activated at the 25% of the lower explosion limits. The room containing corrosive chemicals has a hydrogen chloride receptor that activates a fan when air concentrations reach 10 parts per million (ppm). If levels of volatile chemicals reach 50% of the lower explosion limits, there is an alarm system that is activated, with both an audible alarm and strobe lights. Likewise the alarm is activated if hydrogen chloride concentrations in the corrosives storage area reach 25 ppm.

The alarm system is hard-wired to the sensors and continually reports to the University Police Department (UAPD) via a telephone line. If the alarm is activated, the UAPD dispatcher immediately notifies the **University's Hazardous Materials Emergency Coordinator, Wayne Brashear at 479-263-1622 and/or the Alternate Emergency Coordinator Rick Williams 479-879-2161**. Other personnel are notified as appropriate, according to a contact list provided to dispatch. This list is updated twice a year, in

January and July, or as appropriate.

Many spills and releases can be prevented through careful handling, the use of secondary containers, and ensuring adequate head space in containers of volatile materials. Minor spills and releases that do not extend beyond the confines of the facility may be contained and cleaned up by appropriately trained EH&S personnel, provided it can be done safely and without excessive risk to the personnel. EH&S personnel are charged with making that assessment and responding appropriately. Liquids are absorbed as quickly as possible. A supply of spill response materials is maintained on site, including booms, pillows, clay absorbent, and other materials that may be used for containment and absorption. Solid or particulate materials, including broken glass, are carefully picked up or swept into appropriate containers. Shovels, brooms, and drums for containing contaminated cleanup materials are all stored on site and readily available. EH&S personnel have been issued individual HAZMAT response bags containing full-face respirators, gloves, shoe covers, and other personal protective equipment and clothing, and are able and equipped to respond to a Level C or Level D incident. EH&S also maintains the necessary instrumentation for detecting and quantifying hazardous atmospheres. Contaminated spill materials are put into appropriate containers for disposal as hazardous waste. EH&S personnel who may be called to respond to spills have received RCRA and/or HAZWOPER training.

In the event of a spill or release of any hazardous material that may result in an immediate danger to life or health, all personnel at the facility, whether in a room or on the loading dock shall immediately leave the area and notify University Police by activating the red fire alarm pull station or by dialing 911.

University of Arkansas Police Department (UAPD) and Fayetteville Fire Department will respond to all emergencies at EHSS. (Both agencies receive annual training from EH&S regarding the potential chemical, radiological, and biological hazards associated with the University.) Additionally, the Northwest Hazardous Materials Response Team will respond, if needed. The spill or release will be handled as per protocol established by the Fayetteville Fire Department and/or Northwest Arkansas Regional Hazardous Materials Response Team according to standards and reasonable practices. A windsock is mounted on the south end of the building to aid responders in setting up a perimeter sufficient to protect response personnel and the general public. Washington Regional Medical Center has the equipment, personnel, and facilities necessary to decontaminate and care for personnel who may be injured as a result of a spill or release of hazardous materials.

All University, City, and County response agencies have received a copy of the University of Arkansas Hazardous Materials Emergency Response Plan. The Emergency Coordinator or Alternate Emergency Coordinator will be liaison between responding emergency agencies and the University of Arkansas, and has full authority from the Chancellor to make whatever decisions needed to mitigate the incident, preserve life and property, and to restore all buildings, staff, faculty, and students to normal daily operating conditions. The Emergency Response Coordinator(s) has the authority to request advice and or assistance from other professional and technical personnel from EH&S, and, if

necessary, from knowledgeable University faculty. Upon receiving a call from UAPD dispatch the Coordinator or Alternate Coordinator will:

1. Ascertain the nature and extent of the spill or release.
2. Confer with EH&S Manager or Professional Staff to determine whether cleanup can and should be accomplished by EH&S personnel, i.e. Level C or Level D. If EH&S cleans up the spill, the Coordinator or Alternate Coordinator may assist with cleanup and decontamination of the area.
3. If it is determined that the spill or release requires a Level A or Level B response, a call will be placed to the Regional Hazmat Team. Every attempt will be made to give the responders as much information about the spilled material and the situation as possible.
4. In the event of a major spill or release, the University's Emergency Operations Center (EOC) may be activated and the Emergency Operations Plan (EOP) may go into effect. (Please refer to the University's EOP. Copies may be found at UAPD and in the library of EH&S in the Facilities Management Building.)
5. Media inquiries regarding the spill or release will be handled by University Relations or by the Manager of EH&S.
6. After the spill or release has been contained and or cleaned up, the Coordinator or Alternate Coordinator will make a full report of the incident to the Manager of EH&S.

Hazardous Materials Emergency Response Plan – The University of Arkansas has a Hazardous Materials Emergency Response Plan, the text of which is included here. A complete plan with maps of the campus and floor plans of all the buildings having satellite accumulation sites is on file in the EH&S library, at the Facilities Management Service Center, UAPD, and with all local and regional response authorities.

Purpose

This document will be included in the University of Arkansas' overall Emergency Operations Manual as the part of the institution's plan and procedures for emergency preparedness. However, it was created to be a stand-alone document and will fulfill the requirement for the University to prepare and maintain an emergency response plan for hazardous materials. It may be used as a general reference concerning hazardous materials or, in the event of such an emergency, may be an immediate source of essential information.

Scope

This plan will cover biological, chemical, and radiological hazards in or associated with University of Arkansas facilities. Included are standard operating procedures for reporting, notifications, evacuations, containment, and clean up. Although intended for use primarily by Environmental Health and Safety (EH&S) personnel, copies will be furnished to the following emergency responders and medical units:

*University Police Department
Pat Walker Health Center
Fayetteville Fire Department (Stations 1-7)
Fayetteville Police Department
Central EMS
Washington County LEPC
Washington Regional Medical Center
Northwest Medical Center of Washington County*

*In addition, essential information will be posted on the EH&S web site at:
<http://new-www3.uark.edu/EHSATraining/EHSHome.aspx>*

**EMERGENCY COORDINATOR – Wayne Brashear
479-263-1622**

**ALTERNATE EMERGENCY COORDINATOR – Rick Williams
479-575-4079**

ENVIRONMENTAL HEALTH AND SAFETY PERSONNEL

Fax: 5-6474	Team Position	OFFICE	RADIO	CELL
Miriam Lonon	<i>Manager</i>	575-3597	197	263-2840
Hillary Booth	<i>Compliance Coordinator</i>	575-2909	177	841-5856
Maksudur Sarder	<i>Radiation Safety Officer</i>	575-3379		263-2572
Rick Williams	<i>Chemical Safety Officer</i>	575-4079	268	879-2161
Wayne Brashear	<i>Fire Marshall</i>	575-4419	186	263-1622
Mike Stiles	<i>Campus Safety Coordinator</i>	575-4079	248	841-6222
Daniel Hudson	<i>HazMat Safety Coordinator</i>	575-8473		841-0873
Shatara Porchia-White	<i>Biological Safety Coordinator</i>	575-3533		879-2168

EH&S personnel may be reached at the above numbers. In addition, University Police Department (UAPD) has the home telephone numbers of these individuals and may reach them in the event of an afterhours emergency.

TO REPORT A SPILL OR CHEMICAL RELEASE

Emergency Numbers

911any time

470-575-5448.....M-F 7:30am – 5:00 pm

479-575-2222.....weekends and after hours

DIAL

911

Fayetteville Fire Department

Hazardous Materials Emergency Response Team

Regional Hazardous Materials Response Team

Fayetteville Police Department

University Police Department (also 575-2222)

Environmental Protection Agency

1-866-372-7745

Arkansas Department of Environmental Quality

479-927-3297

National Response Center

1-800-424-8802

Response to Spills and Releases

In the event of a spill or release of a very hazardous material, all personnel should immediately leave the area and, if possible, close the door.

The building fire alarm (if the incident occurs in a laboratory or other facility) should be activated and the building or area should be evacuated. Evacuation routes are posted on each floor of University buildings.

All persons should move to a pre-designated safe zone and the building or area should NOT, under any circumstances be re-entered.

The Fayetteville Fire Department's Hazardous Materials Response Team can be called by dialing 911.

University Police Department (UAPD) will also respond to all 911 calls and will secure the area against re-entry. Officers should NOT enter the area unless they have been trained in HAZMAT response, and then only when wearing appropriate personal protective equipment (PPE).

*In the event of a hazardous materials release, the dispatcher should immediately notify the University's **Hazardous Materials Emergency Coordinator, Wayne Brashear at 479-283-1622** and/or the **Alternate Emergency Coordinator, Rick Williams at 479-879-2161**.*

*The dispatcher should also notify the University's **Chemical Hygiene Officer, Rick Williams at 479-879-2161**, and the **Manager of EH&S, Miriam Lonon at 479-263-2840**. In the event of a fire, a radiological or biological release, or an incident involving the University farm, other persons to be notified are listed on the Contacts List (Page 3).*

In the event of a radiological or biological release, NO ONE, including HAZMAT or other emergency response personnel should enter the area until the University's Radiological/Biological Safety Officer arrives on the scene. Such incidents usually do not pose an immediate danger to life or health and such entry, even by trained responders, may result in spread of contamination.

A knowledgeable individual should be on hand to provide whatever information is available to the responders concerning the identity and nature of the spilled or released material, the amount released, and the particular known hazards associated with it (e.g., toxicity, ignitability, etc.). This individual may be the Principle Investigator, laboratory or shop supervisor, or an individual working in the area.

Environmental Health and Safety personnel respond to all such calls to assist the Response Team. EH&S has expertise in the areas of chemistry, microbiology, and radiation safety. They are able to provide MSDS and other vital information, and may

coordinate access to additional University resources as needed.

University Police Department (UAPD) provides security and crowd control for incidents on the University campus. UAPD monitors and responds to all 911 calls and is the 24/7 contact for EH&S. In the event of a serious spill or release, the University's EOC may be activated.

Laboratory personnel, using appropriate personal protective equipment (PPE), may clean up minor spills under the direction of the laboratory supervisor. Larger spills should be promptly reported to EH&S. Every laboratory or other facility handling chemicals should keep a spill kit containing absorption material and spill pillows or booms.

Environmental Health and Safety personnel (575-5448) clean up most hazardous materials spills on the University campus and farms. Their response is limited to Levels C and D emergencies (may use full-face respirators, but not SCBAs). EH&S personnel have the authority to evacuate a building if the situation is determined to be immediately dangerous to life and health.

Upon receipt of a spill alert, EH&S personnel respond with booms, dams, pillows, clay absorbent, and appropriate containers. To minimize response time, HazMat kits (bags) are kept in respective staff offices. Containers and additional equipment and supplies are stocked at the EH&S Storage Facility (EHSS) at 1530 Mitchell Street.

All contaminated materials are placed in appropriate containers, labeled, and returned to EHSS pending transport as hazardous waste.

EH&S personnel and their areas of expertise are listed below. However, all personnel are cross-trained to respond to various emergencies. Each is qualified to command a spill response and may assume command of a spill incident should the need arise. A 911 call to UAPD will result in contact with appropriately trained EH&S personnel in addition to emergency responders.

*Miriam Lonon, Ph.D.
Maksudur Sarder
Hillary Booth, CSP
Mike Stiles
Wayne Brashear*

*Medical Microbiologist
Radiation Health Physicist
Occupational Safety Specialist
Occupational Safety Specialist
Fire Safety Specialist and EMT*

Additional information regarding the handling of hazardous chemicals and wastes can be found in the Chemical Hygiene Plan included as Appendix 1 of this document.

Medical Facilities and Decontamination

The Washington Regional Medical Center (WRMC) Emergency Decontamination Unit has the facilities, equipment, personnel, and training to treat persons injured in radiological, biological, or chemical incidents. Northwest Medical Center of Washington County is the designated center for patient overflow from WRMC.

Emergency Equipment Available on Campus

EH&S personnel have the following emergency equipment at their disposal:

3 Automatic External Defibrillators

Heating Plant, 845 West Dickson Street

Razorback Recycling, 434 Eastern Street

Environmental Health and Safety, 521 South Razorback Road

Complete Trauma Kit and portable oxygen/demand valve resuscitator

Environmental Health and Safety, 521 South Razorback Road

8 Spill Control Personnel Response bags, each containing:

Tyvek suits, gloves, booties

pH paper

full-face respirator

safety goggles and glasses

barrier tape

tags, labels

disinfectant wipes, towels

biohazard bags

pads, pens

work gloves

safety vest

overshoes

Emergency Response Handbook

NIOSH pocket guide

hard hat

Environmental Health and Safety, 521 South Razorback Road

Spill and boom containment supplies (pigs and pads)

EH&S Storage Building, 1530 W. Mitchell

Oil dry compound (minimum of 20 bags)

EH&S Storage Building 1530 West Mitchell

3 Backhoes

Facilities Management, 521 South Razorback Road

*Dump trucks, flat bed trucks
Facilities Management, 521 South Razorback Road*

*Hydraulic lift gate vehicles, pickups, and specialty equipment
Facilities Management, 521 South Razorback Road*

*Trench shoring equipment, complete set
Facilities Management, 521 S. Razorback Road*

*Hand tools, shovels, brooms, rakes, squeegees, and complete lumber yard
Facilities Management, 521 South Razorback Road.*

*Emergency lighting and generators
Facilities Management, 521 South Razorback Road*

*Fully equipped radiation laboratory with hood
Environmental Health and Safety, 521 South Razorback Road*

Instruments:

*2 small Five Star 4 gas meters: Carbon Monoxide, Oxygen,
Combustible LEL, and Hydrogen Sulfide*

Large Passport 4 gas meter.

2 Q-Rea 4 gas meters.

2 Ludlum single gas Carbon Monoxide meters.

1 MET particle counter.

1 Veloc-O-Meter.

2 battery powered oxygen meters.

2 hand operated LEL detector meters.

1 Biological Sampler.

2 Mini-Rae PID meters

Beckman 6000 Scintillation Counter

5 Eberline GM survey meters

Stereomicroscope

Olympus compound microscope

American Optical compound microscope

Environmental Health and Safety, 521 South Razorback Road

Additional resources in the form of facilities, equipment, and expertise are readily available from the academic departments on the University of Arkansas Campus and are accessible through Environmental Health and Safety or UAPD.

Locations of Hazardous Materials on Campus

The following buildings or facilities may contain hazardous materials. Any incident involving a fire or spill should be presumed to pose the potential for exposure to or release of hazardous materials.

<i>F0006</i>	<i>AGRICULTURE</i>	<i>1140 W. Maple St.</i>	<i>AGRI</i>
<i>F0007</i>	<i>AGRICULTURE FOOD & LIFE SCIENCES</i>	<i>1120 W. Maple St.</i>	<i>AFLS</i>
<i>F0008</i>	<i>AGRONOMY FIELD LABORATORY (A313)</i>	<i>1091 W. Cassatt St.</i>	<i>AGFL</i>
<i>F0013</i>	<i>ALTERNATIVE PEST CONTROL CENTER</i>	<i>979 W. Maple St.</i>	<i>ROSE</i>
<i>F0014</i>	<i>ALTHEIMER GREENHOUSE COMPLEX (A328)</i>	<i>1380 W. Altheimer Dr.</i>	<i>AGRC</i>
<i>F0015</i>	<i>ALTHEIMER LAB (A276)</i>	<i>1366 W. Altheimer Dr.</i>	<i>ALTH</i>
<i>F0007</i>	<i>ANIMAL SCIENCE BUILDING (AGRI. FOOD & LIFE SCIENCES)</i>	<i>1120 W. Maple St.</i>	<i>AFLS</i>
<i>F0027</i>	<i>BELL ENGINEERING</i>	<i>800 W. Dickson St.</i>	<i>BELL</i>
<i>F0028</i>	<i>BIO AGRI ENGINEERING LAB(A300)</i>	<i>1180 W. Cassatt St.</i>	<i>BAEL</i>
<i>F0029</i>	<i>BIOMASS RESEARCH CENTER (A319).</i>	<i>2435 N. Hatch Ave.</i>	<i>BIOR</i>
<i>F0036</i>	<i>BROYLES ATHLETIC COMPLEX</i>	<i>350 N. Razorback</i>	<i>FBAC</i>
<i>F0263</i>	<i>BUS BARN (TRANSIT GARAGE)....</i>	<i>280 S. Eastern Ave.</i>	<i>BUSB</i>
<i>F0064</i>	<i>CENTRAL UTILITY PLANT (HEATING PLANT)</i>	<i>845 W. Dickson St.</i>	<i>HEAT</i>
<i>F0066</i>	<i>CHEMICAL STORAGE BUILDING. A (PHPL)</i>	<i>521 S. Razorback Rd.</i>	<i>CHSA</i>
<i>F0067</i>	<i>CHEMICAL STORAGE BUILDING B (PHPL)</i>	<i>521 S. Razorback Rd.</i>	<i>CHSB</i>
<i>F0068</i>	<i>CHEMICAL STORAGE BUILDING C (PHPL)</i>	<i>521 S. Razorback Rd.</i>	<i>CHSC</i>
<i>F0069</i>	<i>CHEMICAL STORAGE BUILDING D (PHPL)</i>	<i>521 S. Razorback Rd.</i>	<i>CHSD</i>
<i>F0070</i>	<i>CHEMICAL STORAGE BUILDING E (PHPL)</i>	<i>521 S. Razorback Rd.</i>	<i>CHSE</i>
<i>F0071</i>	<i>CHEMISTRY</i>	<i>345 N. Campus Dr.</i>	<i>CHEM</i>
<i>F0072</i>	<i>CHEMISTRY/BIOCHEMISTRY</i>	<i>386 N. Ozark Ave.</i>	<i>CHBC</i>
<i>F0076</i>	<i>CHILLER PLANT (REFRIGERATION PLANT)</i>	<i>870 W. William St.</i>	<i>CHIL</i>
<i>F0086</i>	<i>CRALLEY/WARREN RESEARCH LAB (A213)</i>	<i>2601 N. Young Ave.</i>	<i>VIRO</i>
<i>F0100</i>	<i>ENGINEERING HALL</i>	<i>790 W. Dickson St.</i>	<i>ENGR</i>
<i>F0101</i>	<i>ENGR RESEARCH CENTER</i>	<i>700 Research Center Blvd.</i>	<i>ENRC</i>
<i>F0105</i>	<i>ENTOMOLOGY TOXIC MEDICAL LAB (A299)</i>	<i>1152 W. Isley St.</i>	<i>ETML</i>
<i>F0354</i>	<i>ENV. HEALTH & SAFETY STORAGE BLDG.</i>	<i>1530 W. Mitchell St.</i>	<i>EHSS</i>
<i>F0191</i>	<i>FACILITIES MANAGEMENT (Physical Plant)</i>	<i>521 S. Razorback Rd.</i>	<i>FAMA</i>
<i>F0110</i>	<i>FERRITOR HALL</i>	<i>349 N. Campus Dr.</i>	<i>FERR</i>

F0111	FERTILIZER STORAGE SHED (CLASS D) (A298)	1081 W. Cassatt St.	FEST
F0113	FINE ARTS CENTER	340 N. Garland	FNAR
F0114	FOOD SCIENCE (HORTICULTURE)(A272)	2650 N. Young Ave.	FDSC
F0128	GROUNDS SHOP	726 W. Maple Ave.	GRND
F0137	HEALTH, PHYS, EDUCATION, & RECREATION	155 Stadium Dr.	HPER
F0064	HEATING PLANT (CENTRAL UTILITY PLANT)		HEAT
F0138	HIGH DENSITY ELECTRONICS CENTER (HIDEC)	701 Research Center Blvd.	HDEC
F0140	HOME ECONOMICS	987 W. Maple St.	HOEC
F0153	INSECTICIDE STORAGE BUILDING (A316)	1174 W. Isley St.	INSB
F0184	NORTH CHILLER PLANT	1236 W. Maple St.	NCHL
F0185	OLD MAIN (UNIVERSITY HALL)	416 N. Campus Dr.	MAIN
F0186	OZARK HALL	340 N. Campus Dr.	OZAR
F0342	PAT WALKER HEALTH CENTER	525 N. Garland Ave.	HLTH
F0128	PHPL GROUNDS SAT. SHOP (GROUNDS SHOP)	726 W. Maple St.	GRND
F0190	PHPL RECYCLING (WHSE #1)	434 S. Eastern Ave.	PPRC
F0191	PHYSICAL PLANT (Facilities Management)	521 S. Razorback Rd.	FAMA
F0192	PHYSICS BUILDING	825 W. Dickson St.	PHYS
F0196	PLANT SCIENCE	495 N. Campus Dr.	PTSC
F0203	POULTRY DISEASE LAB (A291)	2754 N. Stephenson Ave.	PODL
F0206	POULTRY HEALTH LAB (A327)	2652 N. McConnell Ave.	POHL
F0208	POULTRY SCIENCE CENTER (JOHN TYSON)	1260 W. Maple	POSC
F0013	ROSEN ALTERNATIVE PEST CONTROL CENTER	979 W. Maple St.	ROSE
F0222	SCIENCE BUILDING (SCIENCE "D")	335 N. Campus Dr.	SCIE
F0223	SCIENCE ENGINEERING	850 W. Dickson St.	SCEN
F0225	SEFOR RESEARCH CENTER	12751 W. Hwy 265	SFOR
F0335	SOUTHWEST CHILLER PLANT	183 N. Stadium Drive	SWCP
F0256	SW RADIATION CALIBRATION CENTER	715 Research Center Blvd.	SWRC
F0263	TRANSIT GARAGE	280 S. Eastern Ave.	BUSB
F0268	UNIVERSITY MUSEUM.	453 N. Garland	MUSE
F0278	WATER QUALITY RESEARCH (A338)	2510 N. Hatch Ave.	WAQR
F0334	WATER TREATMENT BUILDING	854 W. William Street	WTRT

Appendix 2 contains floor plans of research laboratory buildings, showing the location of biological, radiological and chemical research laboratories. It is important to note that activities in a given laboratory may change from one semester to the next. Caution should be used when entering any of these facilities.

Appendix 3 is a 2005-2006 map of the campus.

APPENDIX II

List of Chemicals Approved for Disposal into Sanitary Sewer

The City of Fayetteville waste-water treatment plant (OMI) furnishes a list of chemicals that may be disposed of into the sewer system. This list will be reviewed annually by the Office of Environmental Health and Safety Office and by OMI. As of January 2007, the following chemicals may be safely disposed of into the sanitary sewer following dissolution and dilution to 20% in water. Solid materials may not be sewered. Chemicals not appearing on this list may not be sewered.

Ascorbic Acid	Calcium Fluoride
Benzoic Acid	Calcium Lactate
Boric Acid	Calcium Oxide
Casamind Acid	Calcium Phosphate
Citric Acid	Calcium Sulfate
Lactic Acid	Dextrose
Oleic Acid	Cerelose
Phosphotungstic Acid	Cobalt Oxide
Phthalic Acid	Copper Oxide
Salicylic Acid	Dextrose
Silic Acid	Malt Extract
Stearic Acid	Yeast Extract
Succinic Acid	Ferrous Ammonium Sulfate
Tartaric Acid Agar	Ferrous Sulfate
Albumen	Gelatin
Aluminum	Galactose
Hydroxide	Glycerine
Aluminum Metal	Hematoxylin
Aluminum Oxide	Iron Oxide
Amino Acids	Kaolin,
Alpha Salts (naturally occurring)	Mild Litmus
Ammonium Bicarbonate	Lactose
Ammonium Carbonate	Lithium Carbonate
Ammonium Chloride	Lithium Chloride
Ammonium Citrate	Lithium Sulfate
Ammonium Lactate	Magnesium Borate
Ammonium Sulfamate	Magnesium Carbonate
Ammonium Phosphate	Magnesium Citrate
Ammonium Sulfate	Magnesium Chloride
Barium Carbonate	Magnesium Lactate
Barium Sulfate	Magnesium Oxide
Beef Extract	Magnesium Phosphate
Buffer Solution	Magnesium Sulfate
Calcium Borate	Maltose
Calcium Carbonate	Manganese Acetate
Calcium Chloride	Manganese Dioxide
Calcium Citrate	Manganese Chloride

Manganese Oxide
Manganese Sulfate
Methyl Salicylate
Pepsin
Peptone
Potassium Acetate
Potassium Bicarbonate
Potassium Bisulfate
Potassium Bitartrate
Potassium Borate
Potassium Bromate
Potassium Bromide
Potassium Chloramate
Potassium Chloride
Potassium Carbonate
Potassium Citrate
Potassium Iodide
Potassium Lactate
Potassium Sodium Tartrate
Potassium Sulfate
Potassium Sulfocyanate
Sodium Dodecyl Sulfate
Sodium Acetate
Sodium Ammonium Phosphate
Sodium Benzoate
Sodium Bicarbonate
Sodium Bisulfate Sodium Borate
Sodium Bromide

APPENDIX III

Control Procedures for Flammable and Combustible Liquids

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APPENDIX IV

Safe Handling and Storage of Compressed Gas Cylinders

Gases may present a hazard because they are: flammable, an asphyxiant, an oxidizer, corrosive, toxic, cryogenic and/or under pressure.

Users of compressed gas should be familiar with procedures for the safe operation of cylinders and the properties and inherent hazards of the products they contain. Information concerning specific gases can be found on the product label and in the MSDS.

RESPONSIBILITIES

- Compressed gases must be handled only by properly trained personnel in accordance with applicable regulations and the guidelines.
- The end user (Principal Investigator or Laboratory Supervisor) is responsible for the safe handling and use of compressed gas cylinders and their contents, and for placing and securing the cylinder in the lab.

GENERAL GUIDELINES

- Cylinders must be secured in an upright position at all times during storage, transport and use.
- A cylinder's contents must be identified at all times. Cylinder status (empty, full, in service, etc.) should also be specified.
- The prescribed markings on the cylinders shall be made and kept in a legible condition. The user must not remove or alter any of these markings. If these markings become illegible, the user must provide adequate labeling to identify the contents.
- The labels applied by the gas manufacturer to identify the cylinder contents must not be defaced or removed.
- The user must not modify, tamper with, obstruct, remove, or repair any part of the cylinder, including the pressure relief device and the cylinder valve or the valve protection device.
- Compressed gas streams must not be directed toward any person as this may cause serious injury to the eyes or body.
- Cylinder valve connections must have threads on the regulator connections or other equipment to match those on the cylinder valve.
- The cylinder valve must be kept closed at all times (charged or empty) except when the cylinder is in use. Valve outlets should be pointed away from all personnel when the valve is being opened.
- Piping, regulators, and other apparatus must be kept gas tight to prevent leakage, and this must be confirmed using compatible leak test solution or an appropriate leak-detection instrument. A leak test must be conducted every time the cylinder is reconnected such as during cylinder replacement.
- Before a regulator is removed from a cylinder, the cylinder valve should be closed and the regulator relieved of gas pressure.

- Regulators, gauges, hoses and other apparatus provided for use with a particular gas, or group of gases, must not be used on gas cylinders having different chemical properties unless information obtained from the gas manufacturer indicates that this can be done safely.
- Maintenance of cylinders and their valves or relief devices shall be performed only by trained personnel. This activity is best handled by the original manufacturer.
- An emergency response plan shall be implemented wherever compressed gas cylinders and products are used, handled or stored.

STORAGE

- Containers must not be placed where they might become part of an electrical circuit or arc.
- Compressed gas cylinders must not be exposed to temperature extremes. Storage area temperatures should not exceed 125 degrees F.
- The user must keep valve protection caps on cylinders at all times except when cylinders are secured and connected to dispensing equipment.
- Where valve outlet caps and/or plugs are provided, the user should keep the device on the valve outlet at all times except when the cylinders are secured and connected to dispensing equipment.
- Vented storage areas should be designed to accommodate the various gases required by the user. Adequate spacing, or segregation by partitioning must be provided so that cylinders can be grouped together according to hazard class. Incompatible gases must be separated by a minimum distance of twenty feet, or by a wall with a thirty minute fire rating. Additional consideration should be given to separate storage of full and empty containers.
- Containers are not to be stored near readily ignitable substances or be exposed to corrosive chemicals or fumes.
- Containers must not be stored near elevators, walkways, building egresses, unprotected platform edges, or in locations where heavy moving objects may strike or fall on them. Cylinders are not to be stored in mechanical rooms, custodial closets, or utility spaces.
- All compressed gas cylinders in service or in storage at user locations must be secured to prevent falling/tipping/rolling and shall be stored and used valve end up. They can be secured with straps or chains connected to a wall bracket or other fixed surface, or by use of a cylinder stand.

TRANSPORT

- Users of compressed gas cylinders must ensure that the cylinders are not rolled in the horizontal position or dragged. A suitable hand truck, forklift truck, or similar material handling device designed for cylinder transport should be used with the container properly secured to the device. Extreme caution should be used when

handling cylinders to guard against dropping or permitting cylinders to violently strike against each other or other surfaces.

- It is necessary to take precautions so that gas cylinders are not dropped or allowed to strike each other or other objects. Dropping or striking may damage the cylinder valve, which could turn the cylinder into a dangerous torpedo with the potential to destroy property and/or injure personnel.
- Personnel who handle cylinders must be trained and instructed NEVER to lift cylinders by using the cylinder cap.