University of Wisconsin-River Falls

# Chemical Hygiene Plan

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## Chemical Hygiene Plan UW-River Falls

#### I. Purpose

- A. The purpose of this plan for the University of Wisconsin-River Falls is:
  - 1. To protect laboratory employees and students from health hazards associated with the use of hazardous chemicals in our laboratories; and
  - To assure that our laboratory employees and students are not exposed to substances in excess of the permissible exposure limits (PEL's) as defined by the Occupational Safety and Health Administration (OSHA) and outlined in 29 CFR 1910.1000, Table Z-1 and adopted by reference per the State of Wisconsin Safety and Building Administrative Codes (Comm 32.35). To assist our laboratories' regulatory compliance with the OSHA Laboratory Standard as outlined in 29 CFR 1910.1450.
- B. This plan will be available to all employees and students for review, and a copy will be located in the following areas:
  - 1. Chemistry Department Office, 253 Centennial Science Hall
  - 2. Biology Department Office, 414 Agricultural Science Hall
  - 3. Plant and Earth Science Office, 324 Agricultural Science Hall
  - 4. Animal and Food Science Office, 242 Food Science Addition
  - 5. Risk Management Office, 25H North Hall
  - 6. Online at <u>http://www.uwrf.edu/risk/policies.htm</u>
- C. This plan will be reviewed at least annually and updated as necessary by the Chemical Hygiene Committee.

#### **II. Definitions**

**Laboratory -** Laboratory means a facility where the "laboratory use of hazardous chemicals" occurs. It is an area where relatively small quantities of hazardous chemicals are used on a non-production basis.

#### **MSDS - Material Safety Data Sheet**

A material safety data sheet (MSDS) is a document containing data regarding the properties of a particular substance. An important component of product stewardship and workplace safety, it is intended to provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner, and includes information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill handling procedures.

#### **PEL – Permissible Exposure Limit**

The Permissible Exposure Limit (PEL) is a legal limit in the United States for exposure of an employee to a substance or physical agent. For substances it is usually expressed in parts per million (ppm), or sometimes in milligrams per cubic meter ( $mg/m^3$ ). Units of measure for physical agents such as noise are specific to the agent. Permissible Exposure Limits are established by the Occupational Safety and Health Administration (OSHA).

A PEL is a time-weighted average (TWA). A TWA is the average exposure over a specified period of time, usually a nominal eight hours. This means that, for limited periods, a worker may be exposed to concentrations higher than the PEL, so long as the average concentration over eight hours remains lower.

#### **STEL - Short Term Exposure Limit**

A Short Term Exposure Limit (STEL) is one that addresses the average exposure over a 15 minute period of maximum exposure during a single work shift. A Ceiling Limit is one that may not be exceeded, and is applied to irritants and other materials that have immediate effects.

#### **TLV – Threshold Limit Value**

The Threshold Limit Value (TLV) of a chemical substance is a level to which it is believed a worker can be exposed day after day for a working lifetime without adverse health effects. Strictly speaking, TLV is a reserved term of the American Conference of Governmental Industrial Hygienists (ACGIH). TLVs are published annually by the ACGIH.

#### **III. Basic Rules, Procedures, and Responsibilities**

- A. Specific standard operating procedures for UWRF laboratories are available in Appendix A.
- B. The Chemistry Department Chair will act as the campus Chemical Hygiene Officer (CHO) and have the responsibility to see that this Chemical Hygiene Plan is implemented, followed and maintained. The Chemical Hygiene Officer, in consultation with the appropriate Department Chair, shall have the authority to suspend laboratory operations in part, or in the whole if deficiencies in laboratory procedures or equipment pose a significant threat to the safety of the faculty, employees, or students.

If suspension of laboratory operations is necessary, a written report will be filed with the Provost, the Risk Management Officer, and the Department Chair within 24 hours. A copy of the report with a written description of remedial actions taken to allow resumption of operations will be available in the Provost and Department Chair offices. In addition the CHO will have the following responsibilities:

- 1. Participate in the annual review and update of the Chemical Hygiene Plan.
- 2. Assure maintenance of records of:
  - a. laboratory inspections
  - b. air monitoring
  - c. medical consultation
  - d. accident/incident reports
- 3. Provide examining physician necessary information when a medical consultation is required.
- B. Each affected department will designate a **Chemical Hygiene Representative** who has primary departmental responsibility for the implementation and maintenance of this plan in his or her department. Along with the Chemical Hygiene Officer, the department representatives will form the membership of the Chemical Hygiene Committee and will meet at least annually to review the plan and address any updates or concerns. The Risk Management Officer will call the meetings and facilitate discussion/actions.
- C. **Laboratory instructors** have the responsibility to maintain safe standard operating procedures and maintain or revise the procedures as necessary or needed. In addition, instructors have the following responsibilities:
  - 1. Provide student training as described in the Chemical Hygiene Plan. Documentation of student training will be maintained by the instructor.
  - 2. Report malfunction of safety equipment to the Chemical Hygiene Officer.
  - 3. Promptly file an accident/incident report with the Chemical Hygiene Officer if an accident or spill should occur.
  - 4. Suspend laboratory operations if ventilation is judged to be inadequate for the procedure being conducted.
- D. The **Risk Management Officer** has the responsibility to:
  - 1. Facilitate an annual review and update of the Chemical Hygiene Plan. (More often if necessary.)
  - 2. Conduct annual lab inspections and send results to the Chemical Hygiene Officer.
  - 3. Conduct air quality monitoring in laboratories when requested. Results of air quality monitoring will be sent to the Chemical Hygiene Officer.
  - 4. Provide training if requested.
  - 5. Assist in proper disposal of hazardous waste.
- F. **Laboratory Managers** (or chemical hygiene representative in departments that have no lab manager) are responsible for chemical hygiene in the laboratory. They must ensure that:
  - 1. Employees/Faculty know and follow the chemical hygiene rules.
  - 2. PPE and other protective equipment is available and in working order.
  - 3. Appropriate information and training have been provided, including all PPE training.

4. Requests for information or action are satisfied promptly.

The responsibilities of laboratory managers also include:

- 1. Provide regular, formal chemical hygiene inspections of their facilities and equipment;
- 2. Know the current legal and University requirements concerning regulated substances;
- 3. Conduct each operation in accordance with UWRF chemical hygiene procedures and for developing good personal chemical hygiene habits.
- 4. Maintain teaching laboratory and stock room chemical inventories. This inventory will be updated annually.
- 5. Maintain inventories using safe storage methods.
- 6. Ensure that all containers are correctly labeled.
- 7. Maintain MSDS files on all chemicals in the inventory.
- 8. Appropriately dispose of hazardous wastes generated in the laboratories.
- G. While **students** are not covered under the provisions of the OSHA Laboratory Standard, students must be made aware of chemical health and safety hazards in classroom situations and be provided with information and equipment to protect themselves from those hazards. Departments will provide student training at the beginning of each course in which hazardous chemicals are used. Specific safety instructions should be provided at the beginning of each class period.
- H. **Facilities maintenance personnel** will conduct regular fume hood inspections and oversee the annual maintenance of eyewash stations and laboratory safety showers. They are also responsible for coordinating annual fire extinguisher inspections.

#### **IV. Control Measures to Reduce Exposures to Hazardous Chemicals**

- A. For laboratory uses of hazardous substances, departments must ensure that laboratory employees' exposures to such substances do not exceed the PEL requirements of 29 CFR 1910.1000, July 1, 1992 as specified in the State of Wisconsin Safety and Building Administrative Codes (Comm 32.35).
- B. If it is impossible to eliminate the hazard, exposure to hazardous materials should be minimized to the greatest extent feasible by use of other controls. These controls include the following:
  - Restricting access and signage
  - Adequate ventilation
  - Use of personal protection equipment (PPE)
  - Labels on hazardous materials
  - Procurement, Storage and Handling
  - Additional Safety Equipment

- 1. Restricting Access and Signage
  - a) Facilities placarded with any of the following or similar warning signs are to be regarded as restricted access areas:
    - CAUTION BIOHAZARD
    - CAUTION CARCINOGENS, REPRODUCTIVE TOXINS, OR OTHER EXTREMELY TOXIC CHEMICALS
    - CAUTION RADIOACTIVE MATERIAL
    - CAUTION RADIATION AREA
    - CAUTION X-RAY
    - CAUTION LASER

Such areas are not to be entered except by authorized users of the facility and those having permission from authorized users. Children are never permitted in restricted access areas.

- b) Custodians are permitted to enter restricted areas to perform routine tasks; however, custodians should not touch containers of chemicals (including waste) or other research equipment or materials. Custodians will receive training on hazards in the area as well as procedures for reporting nonemergency concerns and procedures for emergency events.
- c) Appropriate signage will be placed on laboratory doors/entryways, in laboratory areas, and in chemical storage areas. Signage will include:
  - 1) Emergency Response Procedures
  - 2) Phone numbers of emergency responders.
  - 3) Phone number of person(s) responsible for the lab or storage area.
  - 4) Notification of any particular potential hazards such as oxidizer, flammable, ionizing radiation, etc.
- 2. Adequate Ventilation
  - a) Adequate ventilation is essential for maintaining safe levels of exposure. It is the responsibility of the instructor or laboratory manager to discontinue laboratory operations if ventilation is judged to be inadequate for any reason, such as equipment breakdown, unusual odors, or accidental spillage.
  - b) Fume hoods will be used for all operations which have the potential to produce gases, vapors or fumes exceeding the PEL or TLV as defined in IV. A. Fume hoods shall not be used as chemical storage areas. Storing materials in fume hoods reduces their efficiency, and could lead to inadvertent mixing of incompatible chemicals. Where such use is necessary, it shall be designated as storage area, not for operations and will be posted as such.
  - c) Fume hood air flow velocities will be checked annually by Risk Management to determine a proper average face velocity of 100 fpm.

Inspection results will be posted on each fume hood. Fume hoods with inadequate face velocities will be prominently marked as not suitable for use until repaired and will be reported to Facilities Management for action.

- d) Fume hoods will be inspected at a minimum of once a year by maintenance personnel. Copies of fume hood inspections will be kept on file as a part of the preventive maintenance database in Facilities Management. Warnings will be posted and repairs made as needed and as soon as possible.
- e) Air quality monitoring will be performed if faculty or lab managers report a condition which might lead to excessive exposure levels. Risk Management staff will coordinate monitoring. The results of monitoring will be kept by the Chemical Hygiene Officer for the duration of affected employees employment plus 30 years. The Chemical Hygiene Officer will communicate air quality testing results to the Department Chair within 15 days of receipt of the results. The Department Chair will communicate with department personnel as appropriate.
- 3. Use of Personal Protection Equipment (PPE)
  - a) Personal protection involves the use of protective clothing to protect various parts of the body. Eye and face injuries are prevented by the use of the following:
    - safety glasses with side shields for dust and flying object hazards
    - splash-proof goggles for chemical splash, spray and mist hazards
    - full-face and neck shields for head and neck protection from various hazards

Splash-proof goggles provide superior protection against dust, flying objects, and splash, spray and mist hazards. They should be the first choice for primary eye protection.

Cover all unprotected skin surfaces. Do not wear open-toe shoes, sandals, shorts, etc. in a chemical laboratory.

Even when there is minimal danger of skin contact with a hazardous substance, lab coats, coveralls, aprons, or protective suits should be used. Exposures to strong acids and acid gases, organic chemicals and strong oxidizing agents, carcinogens, and mutagens require the use of protective equipment that prevents skin contamination. Impervious protective equipment must be utilized. Examples include:

• protective gloves (vinyl, nitrile)

- rubber boots
- (vinyl, nitrile)rubberized suits
- special protective equipment

Protective garments are not equally effective for every hazardous chemical. Some chemicals will "break through" the garment in a very short time; therefore, garment selection is based on the specific chemical utilized.

The Wisconsin Department of Administration's Personal Protective Equipment Compliance and Hazard Assessment Guide (http://www.doa.state.wi.us/refcenter.asp?locid=0#list) is a comprehensive resource to refer to when making effective PPE choices.

- b) Respirators may only be worn when engineering controls cannot keep exposure to chemicals below PELs. Employees may not wear a respirator until they have completed required elements of the UWRF Respiratory Protection Program. Risk Management has oversight for this program and can be contacted for additional information.
- 4. Labels on Hazardous Material
  - a) The required information on a primary hazardous chemical container label is:
    - 1. Identity of the hazardous substance
    - 2. Appropriate hazard warning
    - 3. Name and address of manufacturer
  - b) Vendors are responsible for ensuring that their products are delivered with the proper labeling. If an unlabeled container is discovered with the initial shipment from the vendor, it should be refused at time of delivery or sent back to the vendor it came from.
  - c) Even though vendors have the primary responsibility in labeling containers of hazardous chemicals, UWRF is responsible for labeling containers of chemicals drawn from the storage containers received from the vendor. These are called secondary containers. To maintain a basic level of safety, UWRF requires that all chemicals in hazardous material areas be clearly labeled. This even applies to commonplace materials (e.g., water) when they are used in hazardous materials areas. Labels on containers of *all* chemicals must have the chemical name. Labels on containers of *hazardous* chemicals must also show the hazard warnings (flammable, corrosive, oxidizer, water reactive, etc.) and health hazards (toxic, irritant, burns).

Labels must be checked to assure they have not become defaced with use. Protective tape can be applied over the label to help protect it when necessary.

If "unknowns" are used in the laboratory for educational purposes they must be labeled as such. A cross reference with proper names of the chemical or substance must be available in case of emergency

- d) Waste containers shall have the contents, date of generation, and generators name and department listed on its label in addition to the words "Hazardous Waste." Additional information which will aid in proper waste disposal should also be included on the label if known such as "Hazardous Waste – acid" or "Hazardous Waste – solvent".
- 5. Procurement, Storage and Handling
  - a) Before a substance is received, information on proper handling, storage, and disposal should be known to those who will be involved in its use. No container should be accepted without an adequate identifying label. The package should also be inspected for leaks or damage. The MSDS file should be checked to see if there is a current document on file. If there is not, follow up with the manufacturer/distributer needs to occur in order to get the most up-to-date version of the MSDS.
  - b) Stockrooms and storerooms will be organized so that hazardous substances are segregated and stored in secondary containment.
    Stored chemicals should be examined periodically (at least annually) for replacement, deterioration, and container integrity.
  - c) Amounts of chemicals stored should be as small as practical. Storage on bench tops and in hoods is not advised. Exposure to heat and sunlight should be avoided. Periodic inventories should be conducted, with unneeded items being appropriately disposed of or returned to the stock room.
  - d) When chemicals are hand carried, individuals are required to follow the UWRF policy entitled "Transporting Chemicals and other Hazardous Items Safely on the UWRF Campus" (See Appendix B).
- 6. Additional Safety Equipment
  - a) Fire Extinguishers Facilities Management coordinates annual fire extinguisher inspections. All faculty/staff are required to maintain clear access and visibility of fire extinguishers.
  - b) Eye Wash Stations Eye wash stations and emergency showers shall be available in areas where the eyes or body of a person may be exposed to injurious materials. Eye wash and emergency showers shall be in an accessible location that requires no more than 10 seconds to reach and shall be identified with highly visible signage. Eye wash stations shall be flushed weekly for at least 3 minutes by designated personnel. Eye wash stations will be tagged with flushing documented. Emergency showers shall be checked by Facilities staff with maintenance documented on attached tag. Employees will be instructed on the location and proper use of eye wash and emergency showers.

- c) Fire Blankets Fire blankets are available in selected labs where potential for fires exists due to use of solvents and other flammables.
- 7. Operations, Procedures or Activities Requiring Prior Approval Prior approval will be obtained from the Department Chair or their representative for laboratory activities which present specific, foreseeable hazards to employees. Such activities include off-hours work, sole occupancy of building, particularly hazardous operations and unattended operations. Examples of the types of operations that should receive prior approval are those involving the use of select carcinogens, reproductive toxins, acutely toxic chemicals, highly reactive or shock sensitive chemicals, or highly corrosive or oxidizing chemicals. In addition, any operation that produces unknown, but potentially hazardous results, should receive prior approval.

a) Unattended Operations -- Procedures carried out continuously or overnight must be planned carefully to avoid hazards from mishaps such as utility failure or failure of cooling water supplies. Arrangements for routine inspections should be made, and in all cases, laboratory lights should be left on and appropriate signs posted warning of the operation.

b) Working Alone -- It is prudent to avoid working in the laboratory alone. Under normal conditions, arrangements should be made between individuals working in separate laboratories outside of working hours to cross check periodically. Experiments known to be particularly hazardous should *never* be undertaken by a worker alone in the laboratory. The Department Chair has primary responsibility for determining which procedures require special safety precautions.

c) The responsibility for approval of the acquisition and use of toxic chemical agents rests with the laboratory supervisor.

In addition to the general safety guidelines mentioned above, special precautions are needed when handling particularly toxic chemicals - such as select carcinogens, reproductive toxins, and chemicals with a high degree of acute toxicity. The laboratory supervisor should ensure that these and other precautions designed to minimize risk of exposure to these substances are taken. The following are minimum guidelines:

 Permission to purchase and use these chemicals will be obtained in advance from the Department Chair. Consultation with the CHO regarding procedures to address all precautions as outlined in this plan are prudent and highly recommended before permission is granted.

- 2) Quantities of these chemicals used or stored in the laboratory and chemical storage areas should be minimized, as should their concentrations in solution or mixtures. Work with carcinogens, reproductive toxins and acutely toxic chemicals should be performed within a functioning fume hood, ventilated glove box, sealed system, or other system designed to minimize exposure to these substances. These protective devices as well as essential personal protective equipment must be researched, purchased and in place in advance of or at the same time as the arrival of the chemical. Compressed gas cylinders that contain acutely toxic chemicals, such as arsine and nitrogen dioxide, should be kept in ventilated gas cabinets.
- 3) Each laboratory utilizing these substances must designate an area for this purpose and sign or mark this area with an appropriate hazard warning. The designated area may be an entire laboratory, an area of the laboratory, or a device such as a fume hood or glove box. The designated area should be marked with a sign stating "DANGER, *specific agent*, AUTHORIZED PERSONNEL ONLY" or comparable warning sign.
- 4) Detection equipment may be required in laboratories where highly toxic chemicals (especially poisonous gases) are used.
- 5) All wastes contaminated with these substances should be collected and disposed of promptly as outlined in the Hazardous Waste Management Plan.
- 6) Treatment of waste products to lessen or eliminate their toxicity as part of the experimental protocol is encouraged as a way of minimizing health hazards and the amount of waste, only if such treatment can be performed safely.
- 7) The designated working area shall be thoroughly decontaminated and cleaned at regular intervals determined by the laboratory supervisor. The interval may be as short as one day or as long as six months depending upon the frequency of usage and level of hazard.
- 8) Special precautions to avoid release and exposure to carcinogens, highly toxic chemicals and reproductive toxins must be utilized. For instance, volatile substances should be kept cool and contained. Gas cylinders should have properly functioning valves, check valves, regulators, containment which can withstand pressure buildup, and appropriate piping; and dispersive solids should be kept in closed containers, used in places with minimal air currents, and appropriate contact materials should be used to avoid static charging.

9) Emergency response planning for releases or spills should be prepared by the laboratory supervisor and included in the training of the laboratory workers and others who may be affected in the building.

#### V. Material Safety Data Sheets

- A. Each department will maintain a central MSDS file for each hazardous chemical for 30 years after the last date the chemical was no longer received on site. Faculty, staff and students will have access to MSDS files during normal office hours. Copies will be available on written request to the Department Chair or Risk Management Officer.
- B. Faculty members responsible for individual research labs are responsible for maintaining MSDS files for these labs.
- C. A back-up MSDS file is located in the Risk Management Office.

#### **VI. Medical Program**

- A. Departments must provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:
  - 1. Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee must be provided an opportunity to receive an appropriate examination.
  - 2. Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.
  - 3. Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultations shall be for the purpose of determining the need for a medical examination.

All medical examinations and consultations must be performed by or under the direct supervision of a licensed physician and must be provided without cost to the employee, without loss of pay and at a reasonable time and place.

- B. The Chemical Hygiene Officer shall provide the examining physician the following information:
  - a. Identity of the hazardous chemical to which the employee may have been exposed,

- b. A description of the conditions of exposure including exposure date if available,
- c. A description of the signs and symptoms of exposure, if any, that the employee is experiencing, and
- d. A copy of the relevant MSDS.
- C. The employer shall request a written opinion from the physician including:
  - a. Recommendations for future medical follow-up,
  - b. Results of examination and associated tests,
  - c. Any medical condition revealed which may place the employee at increased risk as the result of chemical exposure, and
  - d. 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.
  - e. The material returned by the physician shall not include specific findings and/or diagnoses which are unrelated to occupational exposure.
- D. The Chemical Hygiene Officer has the responsibility to work with Human Resources to maintain a file concerning any events and resultant medical examinations or consultations.

#### VII. Hazardous Waste Spills and Disposal

All spills and waste generated in campus laboratories must be managed in accordance with policies found in the UWRF Hazardous Waste Management Program.

#### **VIII. Employee and Student Training**

Laboratory employees, student laboratory assistants, other university affected employees, and students shall receive appropriated training on this policy. Training sessions will be documented and kept on file by the department. Employees must have completed standard Hazard Communication training prior to attending Laboratory Safety Training.

Training will include the following, where applicable:

- 1. Information and training on the hazards of the chemicals present in the labs.
- 2. The contents of the OSHA <u>Laboratory Standard</u> and its appendices <u>A & B</u> (CFR 1910.1450).
- 3. The contents, availability, and location of the written UWRF Chemical Hygiene Plan.
- 4. Information concerning the OSHA <u>1910.1000</u>, July 1, <u>1992 edition</u> permissible exposure limits including discussion of the meaning of all terms, significance of exposure, and location of copies of the exposure limits.
- 5. Signs and symptoms associated with exposure to applicable hazardous chemicals (usually on MSDS).
- 6. Location of reference materials including Material Safety Data Sheets for chemicals in the laboratories.

- 7. Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, visual appearance or odor of hazardous chemicals, odor thresholds, etc.)
- 8. Information concerning the physical and health hazards of the chemicals in laboratory work areas.
- 9. Information about the storage, use, and disposal of hazardous and nonhazardous chemicals in the work area.
- 10. The measures employees can take to protect themselves from chemical hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, engineering controls, standard operating procedures, and personal protective equipment.
- 11. Other information as deemed necessary.

Campus staff from other work departments must be informed by the responsible department of any special hazards to which they might be exposed while working temporarily in the laboratory. This must be coordinated in combination with Facilities Maintenance and the Department. Staff performing routine cleaning in labs must also be informed by the department of any unusual hazards.

#### IX. Contractor Information

Contractors working in labs are to be provided information by the University as to hazards specific to each of their work areas. Facilities Maintenance will inform the department Chair of any contractor work scheduled in a lab. The department Chair will inform the CHO when such work is to be performed. The CHO or designee will then arrange for temporary removal of the hazardous items or work with the Risk Management Officer to schedule the necessary site-specific training or information as necessary to the contractor in coordination with Facilities Maintenance.

## **APPENDIX A – Standard Laboratory Operating Procedures**

#### I. Accidents and Spills

- A. Eye Contact: Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention.
- B. Ingestion: Follow directions on MSDS
- C. Skin Contact: Promptly flush the affected area with water and remove contaminated clothing. If a symptom persists after washing, seek medical attention. Use safety shower if necessary.
- D. Clean-Up: Promptly clean up spills, using appropriate protective apparel and equipment and proper disposal.
- E. Report all incidents

#### II. Avoidance of Routine Exposure

- A. Use appropriate personal protective equipment.
- B. Do not smell or taste chemicals except as directed by instructor. Vent apparatus which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices.
- C. Inspect gloves and test glove boxes before use.
- III. **Choice of Chemicals:** Use only those chemicals for which the quality of the available ventilation system is appropriate.
- IV. **Eating, smoking etc.:** Do not eat, smoke, drink, chew gum or apply cosmetics in areas where laboratory chemicals are present; wash hands before conducting these activities after leaving the lab.

#### V. Equipment and Glassware:

- A. Handle and store laboratory glassware with care to avoid damage. Do not use damaged glassware.
- B. Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments should implosion occur. Use equipment only for its designed purpose.
- C. Compressed gas tanks: Handle with care. Do not move without protective cap. Secure tank at all times.
- VI. Exiting: Wash areas of exposed skin well before leaving the laboratory.
- VII. **Horseplay:** Avoid practical jokes or other behavior which might confuse startle or distract another worker.
- VIII. Mouth Suction: Do not use mouth suction for pipetting or starting a siphon.
  - IX. **Personal Apparel:** Confine long hair and loose clothing. Wear shoes at all times in the laboratory but do not wear sandals or perforated shoes.

#### X. **Personal Protection:**

- A. Wear appropriate eye protection.
- B. Wear appropriate gloves when the potential for contact with toxic materials exists per the Glove Selection Chart (Appendix C); inspect the gloves before each use, wash them before removal, and replace them periodically.
- C. Use any other protective and emergency apparel and equipment as appropriate.
- D. Remove laboratory coats immediately on significant contamination.
- XI. **Planning:** Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation. This includes reading the Material Safety Data Sheet for substances to be used.

#### XII. Use of Hood

- A. Use the fume hood for operations which might result in release of toxic vapors or dust. As a rule of thumb, use a hood or other local ventilation device when working with any appreciably volatile substances with a PEL (Permissible Exposure Limit) of less than 50 ppm.
- B. Confirm adequate hood performance before use. Keep materials stored in hoods to a minimum and do not allow them to block vents or air flow.
- C. Leave the hood on when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is off.
- XIII. **Vigilance:** Be alert to unsafe conditions and see that they are corrected when detected.

#### XIV. Waste Disposal

- A. Deposit chemical waste in appropriately labeled receptacles and follow all other waste disposal procedures of the Chemical Hygiene Plan.
- B. Follow the UWRF Hazardous Waste Management Program for information on correct disposal of hazardous waste.
- XV. **Working Alone:** The following policy has been adopted for all persons using UWRF laboratory facilities:
  - A. No one (including faculty/staff) may work alone if activities involve use or manipulation of hazardous materials or if hazardous conditions exist (E.G. high pressure, high voltage, and vacuum systems). "Working alone" means working out of sight or sound communications with another person for more than 15 minutes at a stretch. Situations where there is danger of explosion, implosion or exposure to UV, X-ray or high voltage require a notice posted on door if left unattended.
  - B. Undergraduate students in scheduled courses must be supervised at all times. Students may not work out of hours for any scheduled course unless

specific permission is granted by the faculty person supervising the lab and students will not be doing any manipulations using hazardous chemicals and hazardous conditions do not exist. Supervising faculty/staff person must submit a list of students, course number, location, and dates to Public Safety in order for students to have permission to have access to areas. This list must be submitted at the beginning of each semester. If a written list is not submitted, students will only have access through the supervising faculty/staff.

C. Student researchers (both graduate and undergraduate students) may never work alone if working with hazardous chemicals or if hazardous conditions exist. Ultimately it is the responsibility of the Department Chair to ensure safe supervision of undergraduate and graduate researchers. The UW System has published guidelines for this in a document entitled Guidelines for Students Working Alone Safely". The website link is: http://www.uwsa.edu/oslp/safety/UWSYSOSH2006-01.pdf The following is a list of standard operating procedures which could be made available to students either as a part of the laboratory manual or during student training.

#### STANDARD OPERATING PROCEDURES FOR STUDENTS

- 1. No eating, drinking, or smoking is permitted in any laboratory.
- 2. Eye protection must be worn when required by the lab instructor. Inform instructor of the use of contact lenses.
- 3. Wear sensible clothing. Loose fitting clothing and open sandals or open footwear should not be worn.
- 4. Long hair must be confined.
- 5. No unauthorized experimentation is allowed. Do not change written laboratory procedures without permission of the instructor.
- 6. Students may not work in the laboratory without an instructor present. (Exceptions may be made depending on the course.)
- 7. Students are not allowed to work in instructional laboratories outside of regularly scheduled hours without written permission of instructor.
- 8. Students should know locations of all available safety equipment. This includes eye wash stations, safety showers, fire extinguishers, fire blanket and first aid supplies.
- 9. Pipetting by mouth is not allowed. Never place anything in the mouth except as directed by instructor while in the laboratory. Smell chemicals only by wafting a small amount of vapor toward the nose with the hand.
- 10. Personal protective equipment besides eye protection (eye protection should be worn at all times) should be used at the direction of the laboratory instructor. This equipment includes gloves when working with certain corrosives and organic solvents and laboratory aprons.
- 11. Keep lab bench clear of book bags and outer clothing. These should be placed in areas provided. Students are responsible for maintaining a safe and clean work area.
- 12. Laboratory fume hoods should be used for all operations which have the potential to release fumes, gases or volatile solvent vapors in excess of recommended exposure levels. Follow written laboratory procedures and the laboratory instructor's directions. Notify the instructor if you think the fume hood is not functioning properly.
- 13. Read lab procedures before entering the laboratory. Do not proceed with an experiment if you do not understand the procedure. All chemical names and identities should be carefully double-checked prior to any use. Check labeling before using a chemical so that potential hazards are know.
- 14. Report all injuries, no matter how minor, to the laboratory instructor. The instructor will give guidance on any appropriate treatment which may be needed or call Security if necessary.
- 15. Proper disposal of laboratory waste is essential. Do not dispose of any chemical down sewer/sink without approval from the instructor. Do not throw chemicals in regular trash as there is a potential for chemical incompatibility and exposure risks for custodians. Use appropriate waste containers when provided.

- 16. Clean up spills promptly. If you should break a mercury thermometer, notify the instructor so that the mercury is promptly recovered. If you have questions on spill clean-up, ask your instructor.
- 17. Only students registered for the class are allowed into the laboratory.
- 18. Students should clean work area and wash hands thoroughly before leaving the laboratory.

I have read and I understand the above standard operating procedures. I understand that it is my responsibility to follow the above procedures and I agree to follow these procedures.

Date: \_\_\_\_\_ Signature: \_\_\_\_\_

### **APPENDIX B** - Transporting Chemicals and other Hazardous Items Safely on the UWRF Campus

#### **Introduction**

The University of Wisconsin-River Falls places safety as a high priority on campus. Transporting hazardous materials requires caution due to the potential for accidental release and personal exposure. Using the same care and caution that is used in experimental procedures during the transport will reduce the potential for risk to the transporter, others, and the environment.

The following guidelines have been established for transporting toxic, flammable, reactive, or corrosive chemicals on campus. Individual departments or building safety committees may want to add more stringent requirements for transportation of these materials within campus buildings.

These guidelines do not apply to radioactive materials or to chemicals packaged for household use. For information on transporting radioactive materials, call the Risk Management Officer at 425-3344.

#### **Guidelines**

#### • Potentially Hazardous Chemicals

- Prior to transporting the material, the individual performing the transport must be familiar with the material's hazards so they can protect themselves and know what to do in the event of a release or spill. The Material Safety Data Sheet (MSDS) for the material is a good source of information to review before the transport. Materials that are unstable, explosive, or extremely or acutely hazardous should not be moved without first contacting the Risk Management Officer at 425-3344 or Public Safety at 425-3133 if the Risk Management Officer is unavailable.
- Hazardous materials must be attended at all times while being transported.
- Appropriate personal protective equipment (PPE) must be worn during the transport. Examples of appropriate PPE include but are not limited to safety goggles, face shields, lab coats, and impermeable gloves. Again, the MSDS for the material is a good source of information to review to determine PPE.
- Use secondary containment to transport the material so the item itself is not being carried by hand. Acceptable secondary containers include plastic bottle carriers with closed tops and handles or liquid-tight carts with lips on all four sides. Contact the department lab manager or the Risk Management Officer for answers to questions about secondary containment.

- Do not transport non-compatible materials in the same secondary container or in any way that might allow the materials to combine or react.
- Use sturdy carts for transporting multiple, large, or heavy containers. Assure the secondary container is a good fit for the cart.
- Label all primary containers appropriately by including the material's name and any associated hazards (e.g., "Acetone Caution-flammable"). Secondary containers must also be labeled with the same information. Once the secondary container has been used for its intended purpose, it needs to be promptly returned to the department that provided it.
- If the material has to be moved between floors, it is preferable to use a freight elevator to assure distance is maintained from others. If a passenger elevator must be used, care should be taken to use it during a time where there is minimal traffic or work with others who are waiting to allow the transporter to travel alone. Stairs should be used only if elevators are not available.
- o Hazardous materials must not be transported in passenger vehicles.
- Transport cryogens only in approved storage vessels (e.g., Dewar flasks with pressure relief mechanisms). Use appropriate PPE including eye protection in the form of a face shield or goggles, heavy gloves, heavy apron, and closed-toed shoes.
- Once the material has been transported and there is no additional concern for safety, the transporter must remove the PPE and clean or dispose of it properly and wash hands.

#### • Biohazardous Materials

Safe biohazardous material transport is required to prevent spills and accidental exposure. Examples of biohazardous materials include:

- Cultures and stock of infectious agents and associated biologicals including culture from medical, pathological, research and teaching laboratories; waste from the production of biologicals; discarded live and attenuated vaccines; and culture dishes and devices used to transfer, inoculate and mix cultures.
- Blood and blood products. Waste consisting of human blood, human blood products (includes serum, plasma, etc.) and items contaminated by free-flowing human blood.
- Pathological waste. All pathological waste and all waste that are human tissues, organs, body parts (including teeth), or body fluids.

- Sharps. Used hypodermic needles, syringes, scalpel blades, Pasteur pipettes, transfer pipettes, transfer pipette tips, scalpel blades, razor blades, blood vials, needles attached to tubing, needles used with sutures, culture dishes regardless of presence or absence of infectious materials, broken glass and similar devices likely to be contaminated with organisms that are pathogenic to healthy humans.
- Animal waste with known infectious agents. All infected animal carcasses, body parts, potentially contaminated bedding, and related wastes. Isolation waste.
- Biological waste and discarded materials contaminated with blood, excretions, exudates, or secretions of humans or animals that are isolated to protect others from highly communicable diseases, or isolated animals infected with highly communicable diseases.

Safe transport includes the following:

- Biohazardous materials must be attended at all times while being transported.
- Appropriate personal protective equipment (PPE) must be worn during the transport. Minimally, impermeable gloves should be worn but other examples of appropriate PPE include but are not limited to safety goggles, face shields, and lab coats depending upon the size and scope of the material.
- Place the biohazardous material in a primary specimen container secured with a tight-fitting cap, Parafilm, or tape.
- Place the primary container (blood tubes, agar plates, flasks, test tubes, for example) in a secondary container with absorbent towels to cushion the primary container and absorb liquids in the event of a leak or spill. Acceptable secondary containers include plastic or metal devices with a lid or a plastic cap.
- The secondary container must be labeled with a biohazard symbol and each primary container should be labeled with its contents. The secondary container should be a dedicated transport vessel.
- Biohazardous material being hand-carried and transported on foot from one building to another on campus must be packaged as indicated above.
- When the package reaches its destination, make sure it isn't damaged. Open it carefully with protective gloves and eyewear. Use of the biological safety cabinet may be necessary depending upon the type of specimen being transported. First open the outer packaging and remove the secondary container. Because the primary container may have leaked, before opening the secondary container, wipe it down with an appropriate disinfectant. If the primary container has leaked,

contact the owner and determine if the item should be autoclaved and discarded in a biohazard container.

• Once the biohazardous material has been transported and there is no additional concern for safety, the transporter must remove the PPE and clean or dispose of it properly and wash hands.

#### Controlled Substances

Due to the potential for diversion and abuse, items identified by the United States Department of Justice Drug Enforcement Agency (DEA) as controlled substances are subject to extensive licensing, registration, storage, security, use, disposal, and inventorying requirements. License holders must document the receipt of Controlled Substances once they are ordered and continue to document use until the time they are disposed of properly.

When transporting controlled substances within or between campus departments, a chain of custody must be maintained. If the controlled substance is not hand delivered by the license holder to another authorized individual, a Chain of Custody Form must be completed. When a Chain of Custody Form is used, the controlled substance must be placed in a secondary container with tamper evident tape securing the package.

Thefts, suspect thefts, unauthorized uses, or other losses of any Controlled Substance must be reported immediately to the departmental chair and to the UWRF Public Safety Director upon discovery.

#### Chain of Custody for Controlled Substances at UW-River Falls for Scientific Research

Controlled Substance: \_\_\_\_\_ DEA License Holder: \_\_\_\_\_

Current Location:\_\_\_\_\_ Destination: \_\_\_\_\_

Name	Signature	Date	Time	Location and Condition of Tamper Evident Tape (if applicable)

A COPY OF THIS FORM SHALL REMAIN IN THE POSSESSION OF THE RESPONSIBLE INDIVIDUAL CURRENTLY IN POSSESSION OF THE CONTROLLED SUBSTANCE. ONCE COMPLETE, RETURN TO DEA LICENSE HOLDER FOR FILING.

## **APPENDIX C - Glove Selection Chart**

Gloves	Material	Usage	Comments	Recommended for	Not recommended
Nitrile	Synthetic Rubber	Incidental contact	Good for solvents, oils, greases, and some acids and bases. Clear indication of tears and breaks. Good alternative for those with latex allergies	Oils, greases, acids, caustics, aliphatic solvents	Aromatic solvents, many ketones, esters, many chlorinated solvents
Butyl	Synthetic Rubber	Extended contact	Good for ketones and esters. Poor for gasoline and aliphatic, aromatic, and halogenated hydrocarbons	Aldehydes, ketones, esters, glycol ethers, polar organic solvents	Aliphatic, aromatic and chlorinated solvents
Neoprene	Synthetic Rubber	Extended contact	Good for acids, bases, alcohols, fuels, peroxides, hydrocarbons, and phenols. Poor for halogenated and aromatic hydrocarbons	Oxidizing acids, bases, alcohols, oils, fats, aniline, phenol, glycol ethers	Chlorinated solvents
PVA	Poly- Vinyl Alcohol	Specific use	Good for aromatic and chlorinated solvents. Poor for water-based solutions	A wide range of aliphatic, aromatic and chlorinated solvents, ketones (except acetone), esters, ethers	Acids, alcohols, bases, water
PVC	Poly- Vinyl Chloride	Specific use	Good for acids, bases, oils, fats, peroxides, and amines. Good resistance to abrasions.	Strong acids and bases, salts, other aqueous solutions, alcohols, glycol ethers	Aliphatic, aromatic and chlorinated solvents, aldehydes, ketones,

			Poor for most organic solvents		nitrocompunds
Viton	Fluoro- elastimer	Extended use	Good for chlorinated and aromatic solvents. Good resistance to cuts and abrasions. Poor for ketones.	Aromatic, aliphatic and chlorinated solvents, and alcohols	Some ketones, esters, amines
Silver Shield	Laminate			Wide range of solvents, acids and bases	
Latex	Natural Rubber	Incidental Contact	Good for biological and water-based materials. Poor for organic solvents. Little chemical protection. Can puncture holes. Can cause or trigger latex allergies.	Weak acids, Weak bases, alcohols, aqueous solutions	Oils, greases and organics (certain hand lotions on hands inserted into gloves will cause loss of integrity)