Chemical Hygiene Plan

of the

Department of Biology

Valdosta State University

Valdosta, Georgia

Prepared/Revised by:

Members of the Laboratory Safety and Hazardous Materials Committee

Department of Biology

Valdosta State University

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Acronyms and Abbreviations

CSO	Chemical Safety Officer
CHP	Chemical Hygiene Plan
DOT	U.S. Dept. of Transportation
EPA	U.S. Environmental Protection Agency
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PPE	Personnal Protective Equipment
SAA	Satellite Accumulation Area
TLV	Threshold Limit Value

Department of Biology, Valdosta State University

Chemical Hygiene Plan

1.1 POLICY STATEMENT

In our work in the biological sciences, we use some equipment and materials which can be hazardous to our employees or our environment if suitable precautions are not taken. It is the policy of the Department of Biology, Valdosta State University, Valdosta, Georgia, to provide a workplace for our employees and a learning environment for our students which is both safe and healthful, and to prevent the uncontrolled release of hazardous materials into the environment.

The objective of this Chemical Hygiene Plan (CHP) is to minimize or eliminate human exposure to hazardous chemicals in the laboratory and in the field. We intend to comply with regulations, standards, and guidelines for safety in our laboratories and research facilities and activities. We intend to protect employees and students from safety and health hazards associated with hazardous chemicals that are used, and to keep all individuals' exposures to airborne chemicals below the acceptable limits.

This written plan is based largely upon a plan devised by the James Whitten Delta States Research Center, USDA-ARS, Stoneville, Mississippi. That plan, was, in turn, based upon recommendations of the Committee on Chemical Safety of the American Chemical Society as published in *Developing a Chemical Hygiene Plan* by Jay A. Young, Warren K. Kingsley, and George H. Wahl, Fr. (American Chemical Society, Washington DC, 1990). It also incorporates recommendations of *The CRC Handbook of Laboratory Safety: 4th Edition* (CRC Press, 1995; hereafter referred to as the *CRC Handbook*), *Prudent Practices for Handling Hazardous Chemicals in Laboratories* (National Academy Press, 1995; hereafter referred to as *Prudent Practices*), *The ACS Guide for Chemical Spill Response Planning in Laboratories* (ACS Task Force on Laboratory Waste Management, 1995, hereafter referred to as the *ACS Spill Guide*), the National Fire Protection Association Standard 45, "Fire Protection for Laboratories Using Chemicals" (NFPA, 1996, hereafter referred to as *NFPA 45*), NFPA Standard 30, "Flammable and Combustible Liquids Code" (NFPA, 1996, hereafter referred to as *NFPA 30*), and NFPA Standard 55, "Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders" (NFPA, 1993, hereafter referred to as *NFPA 55*). It sets forth those procedures, equipment, and work practices that are required to safeguard each person as he/she works with hazardous chemicals. This plan is designed to avoid underestimation of risk.

Hazardous chemicals include those which pose physical hazards as well as those which pose health hazards. Physical hazards include combustible liquids, flammable gases and liquids, flammable solids, and pressure-generating chemicals such as compressed gases, pyrophoric materials, dangerously reactive chemicals, and strong oxidizers. Health hazards include chemicals which may be irritating, corrosive, toxic, highly toxic, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, which damage the lungs, skin, eyes, or mucous membranes, or which can cause adverse reproductive effects or cancer. Health hazards may be either acute or chronic.

This CHP is designed to be a "living document." It will be reviewed annually by the Chemical Safety Officer (CSO) as well as the Biology Department Lab Safety and Hazardous Materials Committee. The CSO and committee members will revise and update the CHP as needed.

1.2 DEFINITION OF RESPONSIBILITIES

1.2.1 The Biology Department Head may serve as the **Chemical Safety Officer (CSO),** or the Head may appoint another faculty member in the department to hold this post. The CSO generally serves on the departmental Lab Safety and Hazardous Materials Committee. The CSO has the ultimate responsibility for providing Department employees and students with a safe and healthy working environment free from recognized chemical hazards. This responsibility includes development and implementation of laboratory safety and chemical hygiene plans, and oversight of programs to see that the plans have adequate resources to be effective.

The **CSO** shall ensure that:

- All applicable Federal and State regulations and established procedures are followed to ensure safe, healthful, and environmentally-protected workplaces.
- All jobs and procedures carried out which require the use of hazardous chemicals are identified.
- A list of such chemicals used in laboratories in each work area is maintained.

- Employee and student concerns about safety precautions in their work areas are promptly responded to.

- No employee is subject to any interference, discrimination, or other type of reprisal for reporting any unsafe or unhealthful condition.

The **CSO** and **supervisors** shall ensure that all employees under their supervision (including visiting scientists and students):

- Know and follow the provisions of the CHP, the Biology Department Safety Manual, and the Emergency Response Plan of Valdosta State University.

- Are trained in all hazards involved in their work and have been trained in safety procedures specific to their work assignment before beginning laboratory work, as prescribed by Appendix A of this Plan.

- Are provided with any required Personal Protective Equipment (PPE) and have received training in its use.

- Receive specialized safety training as required by their work assignments.

- Receive training in the use, storage, and disposal of hazardous chemicals and follow the prescribed procedures for disposal of waste chemicals.

- Purchase and maintain only the minimum amounts of hazardous chemicals required for current work in the laboratories.

1.2.2 The **CSO** shall serve as the coordinator of the Department's Chemical Hygiene Plan. The **CSO** shall:

- Provide technical assistance and guidance in the development and implementation of appropriate safety and chemical hygiene policies and practices.

- Monitor the use and disposal of chemicals used in laboratories.

- Oversee the maintenance of safety, assist in the development of precautions and adequate facilities, and seek ways to improve the chemical hygiene program.

- Know the current legal requirements concerning regulated substances and laboratory safety, chemical hygiene, labeling and storage of hazardous waste, and emergency response to chemical splashes and spills.

- See that up-to-date records are maintained on training of employees for handling hazardous chemicals. ◆ Maintain an up-to-date list of hazardous materials used or stored, and review it annually.

- See that hazard references are available, and that necessary MSDSs are easily accessible.

- Make routine surveys of work areas to ensure that safe practices are being followed, that hazardous materials are labeled, and that hazard information is readily available and used.

- See that procurement of hazardous chemicals is organized so that hazard information and MSDSs are acquired before the chemicals are used, and that hazard labeling information is transferred if the material is repackaged.

- Maintain a list of "inimical" chemicals as defined in Section 2.4 with amounts specified which require use of procedures given in Section 2.4 and a list of "designated areas" designed for work with these chemicals.

1.2.3 All supervisors shall:

- Ensure that all employees and students under their supervision have access to copies of this CHP (http://www.valdosta.edu/vsu/dept/cas/bio/chemsafe.htm), the Biology Department Safety Manual (http://www.valdosta.edu/vsu/dept/cas/bio/safety.htm), the Valdosta State University Biosafety Manual (http://www.valdosta.edu/vsu/dept/cas/bio/BiosafeMan.htm), and the Valdosta State University Emergency Response Plan (Biology Department Main Office, Room 2035, Biology-Chemistry Building).

- Ensure that all employees, including visiting scientists, and students have been trained in safety procedures specific to their work assignment before beginning laboratory work (see Appendix A).

- Ensure that employees they supervise are trained in all hazards involved in their work and properly use any required PPE.

- Identify and recommend to the CSO specialized safety training required by employees they supervise.

1.2.4 All Department of Biology employees and students have specific responsibilities for the safety and health of themselves, their co-workers, and the environment. They shall:

- Plan and conduct each operation in accordance with this CHP, the Biology Department Safety Manual, the Valdosta State University Biosafety Manual, the Valdosta State University Emergency Response Plan, and accepted safety practices.

- Participate in the review and updating of job descriptions and laboratory procedures to incorporate appropriate safety and health measures.

- Follow standard laboratory methods and procedures, and properly use any prescribed PPE.

- Maintain precautionary labels on all containers of hazardous chemicals.

- Know the location and use of MSDSs and emergency equipment.

- Know and participate in emergency planning and procedures.

- Inform their supervisor of any malfunctioning laboratory ventilation or other safety equipment.

- Inform their supervisor of any precautions, equipment, or labels required to ensure a safe work area.

- Inform their supervisor if any employee experiences symptoms or signs of possible overexposure to hazardous chemicals.

- Purchase and maintain only the minimum amounts of hazardous chemicals required for current work in their laboratory.

- Follow all policies and regulations of the Department of Biology regarding disposal of waste chemicals.

2.1 STANDARD OPERATING PROCEDURES

2.1.1 General Rules

1. Wear the appropriate eye protection at all times; see Section 2.1.3.

2. Wear proper footwear at all times; see Section 2.1.3.

3. When working with flammable chemicals, be certain that there are no sources of ignition near enough to cause a fire or explosion in the event of a vapor release or liquid spill.

4. Conduct procedures in a chemical exhaust hood or use a tip-resistant shield for protection whenever an explosion or implosion might occur.

5. Dispose of all wastes in accordance with the applicable Federal, State, and local regulations. **Waste chemicals covered under this plan shall *never* be released into a sanitary sewer system.**

6. The need to work alone in a laboratory outside of regular business hours or on weekends should be minimized to the extent possible. A "buddy" system should be followed by personnel and students working after hours. Employees and students who are working alone after hours or on weekends should have access to a telephone (or cellular telephone) as well as emergency telephone numbers.

When working with chemicals, all personnel and students should know and constantly be aware of the

following:

1. The material's hazards, as determined from the MSDS and other appropriate references.

2. Appropriate safeguards for using that chemical, including appropriate PPE.

3. The appropriate procedures for emergencies, including evacuation routes, spill cleanup procedures, proper waste disposal, and the location and proper use of emergency equipment.

4. How and where to properly store the chemical when it is not in use.

5. Proper personal hygiene practices.

6. The proper methods of transporting chemicals within the facility.

2.1.2 Personal Hygiene

1. Wash promptly whenever a chemical has contacted the skin.

2. Avoid inhalation of chemicals; do not “sniff” to test chemicals.

3. Do not use mouth suction to pipette anything; use suction bulbs or other appropriate apparatus.

4. Wash well with soap and water before leaving the laboratory; do not wash with solvents.

5. Do not eat, drink, smoke, or apply cosmetics in the laboratory. Do not bring food, beverages, tobacco, or cosmetic products into chemical storage or use areas.

6. Do not bring any chemicals or samples into areas used for food or beverage storage, preparation, or consumption.

2.1.3 Protective Clothing and Equipment

1. Eye protection should be worn when working with chemicals. When working with corrosive chemicals, wear goggles as required by the MSDS or other safety reference. When required, also wear a face shield large enough to protect the chin, neck, and ears, as well as the face.

2. When working with corrosive liquids, also wear gloves made of material known to be resistant to permeation by the corrosive chemical; test gloves for the presence of pin-hole leaks.

3. When working with particularly hazardous substances such as acutely highly toxic substances, reproductive toxins, or suspect carcinogens as described in Section 2.4 of this Plan or so identified in the MSDS or on the product label, always wear either a high-necked, calf-or ankle-length, rubberized laboratory apron, or a long-sleeved, calf- or ankle-length, chemical- and fire-resistant laboratory coat.

4. When working with allergenic, sensitizing, or toxic chemicals, wear gloves made of material known to be or tested and found to be resistant to permeation by the chemical and tested for the absence of pin holes.

5. Always wear low-heeled shoes with fully covering “uppers”; do not wear sandals or shoes with open toes in the laboratory.

6. Whenever exposure by inhalation is likely to exceed the threshold limits described in the MSDS, use the material within a chemical exhaust hood. If this is not possible, a proper respirator must be worn. NOTE: Medical clearance by a qualified health care professional, training, and fit testing are required prior to respirator use.

7. Carefully inspect all protective equipment before use. Do not use defective protective equipment.

2.1.4 Housekeeping

1. Access to emergency equipment, showers, eyewashes, and exits must never be blocked by anything, not even a temporarily-parked cart.

2. All chemical containers must be labeled with at least the identity of the contents and the hazards those contents present to users. For any chemical transferred to a temporary container from its labeled container, and which will be kept in that temporary container overnight, the temporary container must be labeled with a summary label stating the chemical name, hazard information, and PPE required.

3. Keep all work areas, especially laboratory benches, clear of clutter.

4. Keep all aisles, hallways, and stairs clear of chemicals.

5. All chemicals should be placed in their assigned storage area at the end of each workday.

6. At the end of each workday, the contents of all unlabeled containers are to be returned to their original container, if possible, or considered to be waste.

7. Wastes should be properly labeled and kept in appropriate tightly-closed containers.

8. Promptly clean up small-scale spills that are not hazardous; properly dispose of the spilled chemical and cleanup materials. (See Section 2.1.6 to determine if what has occurred is a “small-scale spill”.)

9. All work surfaces and floors should be cleaned regularly.

10. No chemicals are to be stored in aisles or stairwells, on desks, or on floors or in hallways.

2.1.5 Procedures Requiring Prior Approval

Personnel and students must obtain prior approval from their supervisor to proceed with a laboratory task whenever one of the following applies:

- It is likely that toxic limit concentrations could be exceeded or that other harm is likely.

- There is a failure of any of the equipment used in the process, especially of safeguards such as chemical exhaust hoods or clamped apparatus.

- There are unexpected results.

- Members of the laboratory staff become ill, suspect that they or other employees or students have been exposed to a hazardous chemical, or otherwise suspect a failure of any safeguards.

- Radioactive compounds not requiring a radiological license to purchase (such as uranyl acetate and similar compounds) will be used.

- Respirator use is necessary.

2.1.6 Spills and Accidental Releases

Despite all precautions, spills and accidental releases of chemicals may occur. Every employee and student shall immediately report such incidents to his/her supervisor and to the CSO. Employees in the area of the spill or accidental release shall then be notified of the spill/release and move to a safe area. Remember, even a small spill can result in a harmful exposure to you or others, or can result in hazards that are not obvious. There are two types of spills: *simple spills*, which you can clean up yourself, and *complex spills*, which require outside assistance. The diagram on the following page can help you determine if what has occurred is a "simple spill". ***Every faculty member and/or supervisor should develop written spill response procedures for materials used in his/her research and teaching laboratories.*** Such procedures should detail the initial steps to take when a spill occurs and include such elements as staff responsibilities, communication methods, instructions on using spill response equipment, and spill cleanup and residue disposal. Communicate these procedures to all individuals who use chemicals or might assist during spill cleanup. The procedures should be reviewed periodically and updated as needed. Before starting work with chemicals, verify that all necessary safety equipment and spill cleanup materials are available and in good working order. Ensure that individuals who may be involved in spill response are properly trained in equipment use and spill cleanup procedures. Materials and equipment shall be inspected at the beginning of each semester or term (in August, January, and May) to ensure that they will be available and function properly when needed.

Does it meet ALL three criteria of a Simple Spill?

1. Does not spread rapidly

✧ Spill or toxic vapors are not spreading beyond the immediate area.

2. Does not endanger people or property except by direct contact

✧ A person has not been injured in the incident.

✧ A fire is not present or an explosion has not occurred.

✧ Flammable vapors and ignition sources are not present.

✧ Toxic vapors or dusts (i.e., inhalation hazards) are not present.

✧ The spilled chemical is not a strong oxidizer.

✧ The spilled chemical is not air, water, or otherwise highly reactive.

✧ The identity of the spilled chemical is known.

3. Does not endanger the environment

✧ There is no risk of the spilled chemical entering a sewer or contaminating soils.

Yes No

Simple Spill	Get Help: This is NOT a Simple Spill
You can clean up yourself *if:* ✧ you have been trained in spill response, cleanup and disposal and are comfortable doing it; ✧ spill cleanup equipment is available; ✧ PPE is available, and you have been trained in its use ✧ you can complete the cleanup in a normal workday	You probably need the help of trained hazardous materials response personnel.

2.1.7 Unattended Experiments and Working Alone

It is preferable to avoid working alone at the bench in a laboratory building. Individuals working in separate laboratories outside of regular working hours should make arrangements to check on each other periodically. Under unusually hazardous conditions, special policies and rules may need to be established.

Laboratory operations involving hazardous substances are sometimes carried out continuously or overnight with no one present. It is the responsibility of the researcher to design these experiments so as to prevent the release of hazardous substances in the event of interruptions in utility services such as electricity, cooling water, and inert gas. Laboratory lights should be left on, and signs should be posted identifying the nature of the experiment and the hazardous substances in use. If appropriate, arrangements should be made for other workers to periodically inspect the operation. Information should be posted indicating how to contact the responsible individual in the event of an emergency.

2.1.8 Procurement, Storage, and Distribution of Chemicals

Each employee is responsible for the proper procurement, storage, and distribution of hazardous chemicals used in his/her teaching and research activities. Hazardous chemicals required for teaching and research shall be obtained, stored, and dispensed in accordance with the guidelines outlined below.

1. **Procurement of Hazardous Chemicals**

All chemicals procured shall have an adequate identifying label. **Materials received without the proper labeling information should not be accepted from the shipper.**

2. **Storage of Hazardous Chemicals**

Hazardous chemicals shall be stored according to the manufacturer's instructions as detailed on the product label and/or in the MSDS. Chemical storage containers and facilities shall be commensurate with the quantities and hazards of the chemicals involved (e.g., flammability, temperature sensitivity, and water reactivity). Stored chemicals shall be examined periodically to assure container and label integrity and to check for signs of deterioration.

Toxic substances shall be segregated in a vented location with adequate hazard markings. Quantities of solvents and other hazardous chemicals shall be kept to the minimum reasonably anticipated to be needed for the work being done.

3. **Distribution of Hazardous Chemicals**

Chemicals shall be transported in approved carts or in a secondary container. Transportation of hazardous chemicals in the passenger elevators should be kept to a minimum, especially if the elevator is occupied by other passengers.

2.1.9 Disposal of Hazardous Chemical Waste

Hazardous wastes generated as a result of research laboratory activities mush be disposed of in accordance with all Federal, State, and local regulations.

Each laboratory in which hazardous chemical waste is generated should have a designated satellite accumulation area (SAA). This area must be at or near the point where the waste is generated, and must be under the control of the operator/generator at all times. Wastes may be collected and stored at the SAA for no more than 6 months or until 55 gals of hazardous waste or 1 quart of acutely hazardous waste are accumulated. When this threshold is reached, the Director of Campus Safety (Mr. Robert DeLong, 293-6171) and/or the Environmental Health and Safety Coordinator (Ms. Meredith Lancaster, 333-2192) should be contacted for arrangement of proper disposal.

The following management standards must be observed for all SAAs:

- containers must be in good condition
- containers must be compatible with the waste
- containers must be marked with the words "Hazardous Waste," or other words which identify the contents. It is good practice to label containers with both the contents and the "Hazardous Waste" designation to prevent the introduction of incompatible wastes into the same container.
- containers are to remain securely closed at all times, except when adding or removing waste
- each SAA should be inspected regularly, and the inspection results documented.

When the volume of accumulated waste reaches 55 gallons (or 1 quart of acutely hazardous waste), the excess waste must be moved to the Valdosta State University hazardous waste storage area as soon as possible.

2.2 PROCEDURE-SPECIFIC SAFETY PROCEDURES

Supervisors must ensure that all laboratory procedures contain a written description of specific safety practices incorporating the applicable precautions described in this section. Employees should read and understand these practices before commencing a procedure.

2.2.1 Procedures for Toxic Chemicals

The MSDSs for many of the chemicals used in the laboratory will state recommended limits or OSHA-mandated limits, or both, as guidelines for exposure. Typical limits are permissible exposure limits (PELs), threshold limit values (TLVs), and action levels.

When such limits are stated, they will be used to assist the researcher and the **CSO** in determining the safety precautions, control measures, and safety apparel that apply when working with a particular chemical.

1. When a PEL or TLV is less than 50 ppm or 100 mg/m^3, the user of the chemical must use it in a properly-functioning chemical exhaust hood, glove box, vacuum line, or similar device, which is equipped with appropriate traps and/or scrubbers. If none are available, no work should be performed using that chemical.

2. If a PEL, TLV, or comparable value is not available for a substance, the animal or human median inhalation lethal concentration (LC_{50}) information will be assessed. If that value is less than 200 ppm or 2,000 mg/m^3 (when administered continuously for one hour or less), then the chemical must be used within the confines of the properly-operating equipment described above.

3. Whenever laboratory handling of toxic substances with moderate or greater vapor pressures will be likely to exceed air concentration limits, laboratory work with such liquids and solids will be conducted in a chemical exhaust hood, glove box, vacuum line, or similar device. If none are available, no work should be performed using that chemical.

2.2.2 Procedures for Flammable Chemicals

In general, the flammability of a chemical is determined by its flash point, the lowest temperature at which a liquid gives off a vapor in sufficient concentration to ignite under certain controlled conditions.

1. Chemicals with a flash point below 100°F (37.8°C) will be considered flammable.

2. Flammable chemicals should be used only in vented hoods and away from sources of ignition.

2.2.3 Procedures for Reactive Chemicals

Reactivity information is sometimes given in the MSDS and on product labels.

1. A reactive chemical is one that:

   - ◆ is described as such in the MSDS,
   - ◆ is ranked by the NFPA as 3 or 4 for reactivity,
   - ◆ is identified by the DOT as:
     - an oxidizer,
     - an organic peroxide, or
     - an explosive, Class A, B, or C,
   - ◆ is known or found to be reactive with other substances.

2. Handle reactive chemicals with all proper safety precautions, including segregation in storage and prohibition on mixing even small quantities with other chemicals without prior approval of the supervisor and the use of appropriate PPE and precautions.

2.2.4 Procedures for Corrosive Chemicals and Contact-Hazard Chemicals

Corrosivity, allergenic, and sensitizer information is sometimes given in the MSDS and on product labels.

1. A corrosive chemical is one that:

   - has a pH greater than 12.5 or less than 2.0, or
   - is know or found to be corrosive to living tissue.

2. A contact-hazard chemical is an allergen or sensitizer that:

   - is so identified or described in the MSDS or on the label,
   - is so identified or described in the medical or industrial hygiene literature, or

   is known or found to be an allergen or sensitizer.

3. As noted in 2.1.3(1), handle corrosive chemicals with all proper safety precautions, including wearing both safety goggles and a face shield when required, compatible gloves tested for absence of pin holes and known to be resistant to permeation or penetration, and a laboratory apron or laboratory coat.

2.2.5 Procedures for Compressed Gases in Portable Cylinders

Compressed gases present the worker with both chemical and physical hazards. Precautions are necessary for handling the various types of compressed gases, the

cylinders that contain them, the regulators that control their flow, the piping used to confine them during flow, and the vessels in which they are ultimately used.

A compressed gas is one that:

- is so defined by OSHA or by DOT.
- is contained in an approved compressed gas container

1. Conspicuous signs should be posted in flammable compressed gas storage areas which identify the substance(s) and the appropriate precautions.

2. Gas cylinders (whether empty or full) shall be transported on sturdy, wheeled carts designed for this purpose. The carts must have restraining straps or chains. Gas cylinders shall **never** be dragged, rolled, or slid across the floor.

3. Gas cylinders shall be secured firmly at all times.

4. The appropriate regulator valve shall be properly attached to cylinders ready for use.

2.3 CONTROL MEASURES AND EQUIPMENT

Chemical safety is achieved by continual awareness of chemical hazards and by keeping the chemical under control by using precautions, including engineering safeguards such as exhaust hoods. Laboratory personnel should be familiar with the precautions to be

taken, including the use of engineering and other safeguards. Laboratory supervisors should be alert to detect the malfunction of engineering and other safeguards.

All engineering safeguards and controls must receive appropriate preventative maintenance, be inspected on a regular basis, and never be overloaded beyond their design limits. Inspections shall ensure that control devices are functioning as designed and are providing the required protection. When inspection of any device reveals it is not functioning properly, that device shall be removed from service until repaired, and a sign shall be placed on the device indicating that it is out of service. The sign shall specify appropriate alternate personal protective measures. Certification by properly trained individuals shall be maintained on all equipment requiring certification.

Engineered controls are designed to limit human exposure to hazardous chemicals used in the laboratory. Examples of engineered controls include, but are not limited to:

chemical exhaust hoods

glove boxes

isolation chambers

work area exhaust fans

negative pressure ventilation

monitoring/warning devices

PVC-coated bottles

safety containers for transport of chemicals

shields and screens

flammable-liquid safety containers

automatic fire-suppression systems

eyewashes and safety showers

respirators

robotics

2.3.1 Ventilation

1. Work with toxic chemicals that have low air concentration limits, or that have high vapor pressures, should always be done in a hood.

2. The sash of chemical exhaust hoods should be lowered as much as possible while still allowing manipulation of equipment within the hood. A rule of thumb is to maintain the sash at or below the chin level of the operator. Working heights and face velocities should be marked on the hood face. If this information is not shown, faculty members/supervisors should notify the CSO, who will contact the Director of Campus Safety (Mr. Robert DeLong) and the Environmental Health and Safety Coordinator (Ms. Meredith Lancaster).

3. Laboratory employees should understand and comply with the following:

a. A chemical exhaust hood is a safety backup for condensers, traps, or other devices that collect vapors and fumes. It is **not** used to "dispose" of chemicals by evaporation unless the vapors are trapped and recovered for proper waste disposal.

b. Hoods should not be used as storage areas for chemicals, apparatus, or other materials.

c. Exhaust hood sashes should be lowered (closed) at all times except when necessary to adjust apparatus within the hood.

d. The hood fan should be kept "on" whenever a chemical is inside the hood, whether or not any work is being done in the hood.

e. Personnel should be aware of the steps to be taken in the event of the loss of power or other equipment failure.

f. Maintenance personnel shall inspect hood vent ducts and fans at frequent intervals to be sure they are both clean and clear of obstructions.

2.3.2 Flammable-Liquid Storage

1. Flammable liquids (see paragraph 2.2.2.1) in quantities greater than 1 liter should be kept in metal safety cabinets.

2. Cabinets designed for the storage of flammable materials should be properly used and maintained. Read and follow the manufacturer's information and also follow these safety practices:

   a. Store only compatible materials inside a cabinet.

   b. Do not store paper or cardboard or other combustible packaging material in a flammable-liquid storage cabinet.

   c. The manufacturer establishes quantity limits for various sizes of flammable-liquid storage cabinets; do not overload a cabinet.

2.3.3 Eye Wash Fountains and Safety Showers

1. All laboratories in which corrosive or hazardous chemicals are used shall be equipped with eye washes and safety showers.

2. The functioning of eyewash fountains shall be checked weekly, and safety showers shall be checked monthly. Water flow from these units will be measured regularly (approximately once a year).

3. Any facility that does not meet the water flow requirements shall be so tagged, and promptly repaired.

4. Access to eye washes and safety showers shall not be restricted or blocked by temporary storage of objects or in any other way.

2.3.4 Respirators

Employees should wear respirators whenever it is possible that engineering controls or work practices could become or are ineffective and the possibility exists that the employee might be exposed to vapor or particulate concentrations greater than the PEL, TLV, action level, or similar limit, whichever is lowest.

2.3.5 Vapor Detection

Do not use odor as a means of determining that inhalation exposure limits are or are not being exceeded. Whenever there is reason to suspect that a toxic chemical inhalation limit might be exceeded, whether or not a suspicious odor is noticed, notify your supervisor. Laboratory workers should wear a respirator suitable for protection against the suspect chemical until measurements of the concentration of the suspect vapor show that the limit is not exceeded. Under this circumstance, if there is no reason to anticipate an increase in the concentration of the chemical and the supervisor approves, the respirator can be removed.

2.4 PROCEDURES FOR "PARTICULARLY HAZARDOUS SUBSTANCES" SUCH AS SELECT CARCINOGENS, REPRODUCTIVE TOXINS, SUBSTANCES THAT HAVE A HIGH DEGREE OF ACUTE TOXICITY, AND CHEMICALS OF UNKNOWN TOXICITY

Follow the procedures described in this section when performing laboratory work with any chemical in the categories listed above in amounts greater than those specified for each such chemical in the current list available from the CSO. Further information on these chemicals can be found on the National Institute of Environmental Health Sciences web site at: http://www.niehs.nih.gov/.

1. The following definitions shall apply:

   a. **Select carcinogen**: Any substance defined as such in the applicable MSDS.

   b. **Reproductive toxin**: Any substance described as such in the applicable MSDS or identified as a reproductive toxin by the Oak Ridge Toxicology Information Response Center [423-576-1746];

   c. **Substance with a high degree of acute toxicity**: Any substance for which the LD_{50} data described in the applicable MSDS cause the substance to be classified as a "highly toxic chemical".

   d. **Chemicals whose toxic properties are unknown**: A chemical for which there is no known statistically significant study conducted in accordance with established scientific principles that establishes its toxicity.

   e. For the purpose of the CHP, chemicals in these four categories will be referred to as **inimical**.

   f. **Designated area**: A hood, glove box, portion of a laboratory, or an entire laboratory room designated as the only area where work with quantities of the inimical chemical in excess of the specified limit shall be conducted.

2. Only those persons trained to work with inimical chemicals will work with those chemicals in a designated area or transport them to or from the approved storage areas. All such personnel will:

   a. Use the smallest amount of chemical that is consistent with the requirements of the work to be done.

   b. Appropriately decontaminate a designated area when work is completed.

3. Store all inimical chemicals in locked and enclosed spaces.

4. Because the decontamination of jewelry may be difficult or impossible, do not wear jewelry when working in designated areas.

5. Wear long-sleeved fully-buttoned disposable laboratory coats and gloves known to resist permeation by the chemicals when working in a designated area. Such lab coats and gloves are to be worn only in the designated area while working with inimical chemicals, and are to be removed and bagged for proper disposal at the end of the work session. Do not wear lab coats or gloves into any offices, public areas, or areas approved for food or beverage storage, preparation, or consumption.

3.1 **RECORDS AND RECORD KEEPING**

1. Records of air concentration monitoring results, exposure assessments, and medical consultations and examinations will be maintained by the Biology Department Head for at least 30 years and they will be accessible to employees or their representatives.

2. Documentation on distribution and maintenance of MSDSs, safety training of employees and students, and of significant employee and student safety suggestions shall be maintained by the Biology Department Head for the life of the Department of Biology.

3. Specific records required in the event of lost work time resulting from an exposure or accident on the job (such as OSHA Form 200 or its equivalent) will be maintained for five years.

4. Records documenting employee and student exposure complaints and suspected exposures, regardless of the outcome of an exposure assessment, will be maintained for 30 years after the employee has terminated employment with the Agency.

5. Other records which may be useful for future reference include:

   a. Major safety suggestions from employees and students. A suggestion that is unusable today might be useful tomorrow. Even when a suggestion is clearly non-workable, it should be taken seriously, examined, and recorded.

   b. Near-miss reports. Employees and students who participate in or witness events that could have caused harm, but fortunately did not, should prepare reports of the incident. These reports are used to develop changes in procedures that will prevent a future, possibly more serious, occurrence.

   c. Repair and maintenance records for control systems. These are useful; they suggest corrective actions and indicate that equipment was or was not well maintained and kept in working condition.

   d. Complaints from employees and students. It is useful to keep a record of all complaints, investigations, and outcomes. Even when not justified, especially when a complaint correctly or incorrectly involves defects in and difficulties with

operating equipment, the record may prove to be invaluable if that equipment develops a defect or malfunction at a later date.

APPENDIX A

Employee Information and Training

All newly-hired laboratory employees will receive training in all applicable safety procedures before beginning any laboratory work, and will have access to this CHP (http://www.valdosta.edu/vsu/dept/cas/bio/chemsafe.htm), the Biology Department Safety Manual (http://www.valdosta.edu/vsu/dept/cas/bio/safety.htm) the Valdosta State University Biosafety Manual (http://www.valdosta.edu/vsu/dept/cas/bio/BiosafeMan.htm), the Valdosta State University Policy on the Humane Care and Use of laboratory Animals (http://www.valdosta.edu/iacuc/), the Valdosta State University Policy for the Protection of Human Subjects in Research and Research-Related Activities (http://www.valdosta.edu/grants/irb98a.shtml), the Valdosta State University Emergency Response Plan (Biology Department Office, Room 2035, Biology-Chemistry Building)., and the Controlled Substances Act (http://www.usdoj.gov/dea/pubs/csa.html).

Supervisors are responsible for training employees and students under their supervision in all safety procedures specific to the employee's work assignment before such work is initiated.

1. The supervisor shall provide all laboratory employees and students with information and training concerning the hazards of chemicals in his/her laboratory areas.

2. The supervisor shall provide such information and training when an employee is initially assigned to a laboratory where hazardous chemicals are present and also prior to assignments involving new hazardous chemicals and/or new laboratory work procedures.

3. All employees and students shall be informed of:

   a. The content, location, and availability of the Chemical Hygiene Plan.

   b. The PELs, action levels, and other recommended exposure limits for hazardous chemicals as found in used in the employee's work area.

c. Signs and symptoms associated with exposures to the hazardous chemicals used in the laboratory.

d. The location and availability of MSDSs and other reference materials which provide requirements for the safe handling, storage and disposal of hazardous chemicals.

4. Employee training shall include:

a. The methods and observations that may be used to detect the presence or release of a hazardous chemical.

b. The health and physical hazards associated with the chemicals used in the employee's work area.

c. The measures employees can use to protect themselves from these hazards, including specific procedures such as appropriate work practices, personal protective equipment to be used, and emergency procedures.

d. Completion of the following online training programs: Right-to-Know Basic Awareness Training Program, Right-to-Know Chemical Specific Training Program, and Hazardous Waste Awareness Training Program (http://www.usg.edu/ehs/training/).

e. Additional basic training, including instructional videos, as recommended by the Director of Campus Safety (Mr. Robert DeLong) and the Environmental Health and Safety Coordinator (Ms. Meredith Lancaster).

APPENDIX B

Exposure Assessments, Medical Consultations, and Examinations

1. Suspected Exposures to Toxic Substances

There may be times when employees or supervisors suspect that an employee has been exposed to a hazardous chemical to a degree and in a manner that might have caused harm to the victim. If the circumstances suggest a reasonable suspicion of exposure, the victim is entitled to a medical consultation by a licensed physician and, if so determined in the consultation, also to a medical examination by a licensed physician at no cost and with no loss of workday time attributed to the victim.

1.1 Criteria for Reasonable Suspicion of Exposure

1. It is the policy of the Department of Biology to promptly investigate all employee-reported incidents in which there is even a remote possibility of employee overexposure to a toxic substance.

2. Events or circumstances that might reasonably constitute an overexposure include:

    a. A hazardous chemical leaked, spilled, or was otherwise rapidly released in an uncontrolled manner.

b. A laboratory employee or student had direct skin, eye, or inhalation contact with a hazardous chemical.

c. A laboratory employee or student manifests symptoms, such as headache, rash, nausea, coughing, tearing, irritation or redness of eyes, irritation of nose or throat, dizziness, loss of motor dexterity or judgement, etc., and

- some or all of the symptoms disappear when the person is removed from the exposure area and breathes fresh air, and

- the symptoms reappear soon after the employee or student resumes work with the chemicals.

d. Two or more persons in the same laboratory work area display similar symptoms or complaints.

1.2 Exposures

All complaints (concerning possible exposures) and their disposition, no matter what the ultimate disposition may be, are to be documented. If no further assessment of the event is deemed necessary, the reason for the decision should be included in the documentation. If the decision is to investigate, a formal exposure assessment will be initiated.

1.2.1 Exposure Assessment

In case of emergency, exposure assessments are conducted after the victim has been treated.

NOTE: It is not the purpose of an exposure assessment to determine that a failure on the part of the victim, or others, to follow proper procedures was the cause of an exposure. The purpose of an exposure assessment is to determine that there was, or was not, an exposure that might have caused harm to one or more employees or students; and, if so, to identify the hazardous chemical(s) involved. Other investigations might well use results and conclusions from an exposure assessment, along with other information, to derive recommendations that will prevent or mitigate any future exposures. However, the purpose of exposure assessments is to determine facts, not to make recommendations.

Unless circumstances suggest other or additional steps, these actions constitute an exposure assessment:

1. Interview the complainant and the victim, if not the same person.

2. List the essential information about the circumstances of the complaint, including:

   - the chemical under suspicion
   - other chemicals used by the victim
   - all chemicals being used by others in the immediate area
   - other chemicals stored in that area
   - symptoms exhibited or claimed by the victim

- how these symptoms compare to symptoms stated in the MSDS, or other reliable data source, for each of the identified chemicals

- were control measures, such as PPE and hoods, properly used?

- were any air sampling or monitoring devices in place? If so, are the measurements obtained from these devices consistent with other information?

3. Monitor or sample the air in the area for suspect chemicals.

4. Determine whether the present control measures and safety procedures are adequate.

1.2.2 Notification of Monitoring Results

Within 15 working days of receipt of any monitoring results, notify employee or student of those results.

2. Medical Consultation and Examination

The details of medical consultations and examinations are determined by the physician.

The purpose of a medical consultation is to determine whether a medical examination is warranted. When the results of an exposure assessment suggest or confirm that an employee was overexposed to a hazardous chemical, the employee should obtain medical consultation from, or under the direct supervision of, a licensed physician.

When warranted, employees also should receive a medical examination from, or under the direct supervision of, a licensed physician who is experienced in treating victims of chemical overexposure. The medical professional should also be knowledgeable about which tests or procedures are appropriate to determine if there has been an overexposure; these diagnostic techniques are called “differential diagnoses.”

These provisions apply to medical consultations and examinations:

1. The Department of Biology shall provide all employees who work with hazardous chemicals an opportunity to receive medical consultation and examination when:

   a. The employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory.

   b. Monitoring, routine or otherwise, suggests that there could have been an exposure above the action level, or PEL if there is no action level, for a chemical for which a substance-specific standard has been established.

   c. There is a spill, leak, or other uncontrolled release of a hazardous chemical.

2. Provide the physician with:

   a. The identity of the hazardous chemical(s) to which the employee may have been exposed.

   b. The conditions of the exposure.

c. The signs and symptoms of exposure the victim is experiencing, if any.

3. The physician shall furnish the following, in written form, to the Biology Department Head:

a. Recommendations for follow-up, if determined to be pertinent.

b. A record of the results of the consultation, and if applicable, of the examination and any tests that were conducted.

c. Conclusions concerning any other medical condition noted that could put the employee at increased risk.

d. A statement that the employee has been informed both of the results of the consultation or examination and of any medical condition that may require further examination or treatment.

4. These written statements and records should not reveal specific findings that are not related to an occupational exposure.

2.1 Documentation

All memos, notes, and reports related to a complaint of actual or possible exposure to hazardous chemicals are to be maintained as part of the record.

2.2 Notification

Employees shall be notified of the results of any medical consultation or examination with regard to any medical condition that exists or might exist as a result of overexposure to a hazardous chemical.

APPENDIX C

Safety References

Safety Resources

Paper copies of MSDSs are maintained in the Department of Biology Main Office, Biology-Chemistry Building, Room 2035, as well as in the appropriate laboratories.

Useful Websites for Chemical Safety Information:

Valdosta State University Campus Safety - http://services.valdosta.edu/safety/

VSU Campus Safety, Useful Links - http://services.valdosta.edu/safety/links.aspx

U.S. Dept. of Labor, Occupational Safety and Health Administration -- http://www.osha.gov/

National Fire Protection Association – http://www.nfpa.org/

Agency for Toxic Substances and Disease Registry – http://www.atsdr.cdc.gov/

Hazardous chemicals and MSDSs:

http://hazard.com/msds/

http://www.ilpi.com/msds/index.html

Environmental Health & Safety, University System of Georgia – http://www.usg.edu/ehs/GA

Gateway for Safety and Health Information Resources (Osh.net) – http://www.osh.net/

University of Connecticut Environmental Health and Safety Home Page – http://cortex.uchc.edu/~safety/ehs/ehs.html