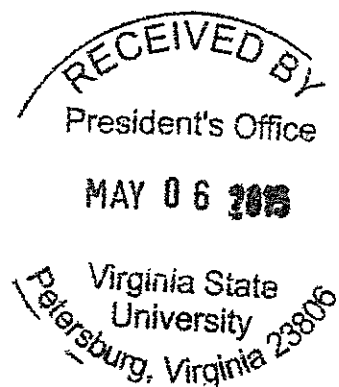


Virginia State University

**College of Natural
And
Health Sciences**

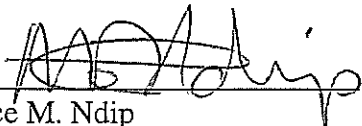
Chemical Hygiene Plan

2015 – 2017



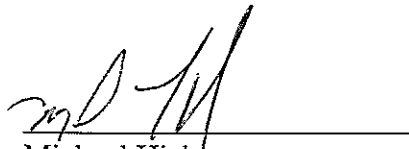
Virginia State University
Chemical Hygiene Plan
Signature Approvals

Approvals



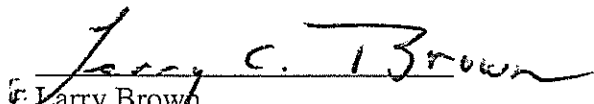
Grace M. Ndip
Chair, Department of Chemistry

4/16/15
Date



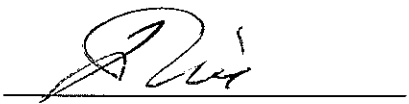
Michael Hickman
Virginia State University Safety Officer

4-22-15
Date



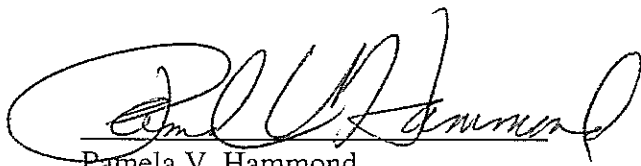
Larry Brown
Dean, College of Natural and Health Sciences

04/22/2015
Date



Weldon W. Hill
Provost and Vice President of Academic Affairs

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Date



Pamela V. Hammond
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Date

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I. Purpose

The Chemical Hygiene Plan describes procedures and practices that ensure faculty, staff, and students working in a laboratory in the Departments of Chemistry, Biology, Nursing and Psychology are protected from potential safety and health hazards associated with chemicals utilized in these laboratories. This plan is required by the U.S. Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.1450 entitled *Occupational Exposures to Hazardous Chemicals in Laboratories*, referred to as the Lab Standard. The text of the Lab Standard can be viewed at the OSHA web site in addition to general information about hazard communication.¹

II. Definitions

The definitions contained herein are from the Laboratory Standard.

- a. **Chemical Hygiene Plan:** a written program developed and implemented by the faculty and chair of the Department of Chemistry which sets forth the procedures, equipment, personal, equipment, and practices that (1) protect employees and students from hazardous chemicals used in the laboratories and (2) meet the requirements of paragraph (e) of the Laboratory Standard.
- b. **Employee:** an individual employed in a laboratory workplace that may be exposed to hazardous chemicals in the course of his/her assignments.
- c. **Hazardous chemical:** a chemical for which there is statistically significant evidence, based on at least one study conducted in accordance with established scientific principals that acute or chronic health effects may occur in exposed employees. The term *health hazard* includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, and neurotoxins, agents which act on the hematopoietic systems and agents which damage the lungs, skin, eyes, or mucous membranes.
- d. **Laboratory:** a facility where the “laboratory use of hazardous chemicals” occurs; a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.
- e. **Laboratory scale:** work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. “Laboratory scale” excludes those workplaces whose function is to produce commercial quantities of materials.

III. Applicability and Assistance

The Lab Standard applies to all employers engaged in the laboratory use of hazardous chemicals. This Chemical Hygiene Plan applies to all employees in the College of Natural and

Health Sciences at Virginia State University. The departments in the College of Natural and Health Sciences covered by this plan are Biology; Chemistry; Nursing; and Psychology. While not employees of the University, the Chemical Hygiene Plan specifies that students involved in any laboratory activities must adhere to the requirements of the plan. Questions regarding this plan should be addressed to the Chemical Safety Officer (see Appendix 1 for a listing of personnel).

IV. Responsibilities

The College of Natural and Health Sciences (CNHS) at the Virginia State University is committed to providing a safe and healthful environment for all persons associated with the College. CNHS administrators, faculty, staff, and students are expected to support these goals. The responsibilities of the personnel are as follows:

a. The Dean of the College of Natural and Health Sciences is ultimately responsible for the implementation of the Chemical Hygiene Plan. The Dean (or his/her designee) shall:

1. Identify those departments within the College to which the lab standards apply;
2. Appoint a College Chemical Safety Officer;
3. Appoint a College Chemical Hygiene Officer;
4. Approve and support the Chemical Hygiene Plan;
5. Support the Department of Chemistry in maintaining a Permanent/Full-Time Stockroom and Laboratory Manager; and
6. Make budget arrangements for health and safety improvements.

b. Department Chairs have primary responsibility for the implementation of the Chemical Hygiene Plan within their respective departments. The department chairs shall:

1. Appoint a departmental representative to the Chemical Safety Committee;
2. Work with faculty and staff to adapt the Chemical Hygiene Plan to include department and/or laboratory specific guidelines;
3. Ensure that each laboratory has a specific person designated as a laboratory supervisor for the laboratory. This is especially important for labs that have many users, such as teaching labs;
4. Make budget requests for health and safety improvements;
5. Support the safety program;
6. Ensure that faculty and staff adhere to the Chemical Hygiene Plan and accepted safety practices; and
7. Maintain a current copy of the plan in the Department office.

c. The College Chemical Safety Officer shall:

1. Ensure that the College Chemical Hygiene Plan is reviewed annually and modified as necessary;

2. Chair the College's Chemical Safety Committee;
 3. Maintain documentation relating to the Chemical Hygiene Plan, including training records, internal inspection records, and copies of meeting minutes and memos;
 4. Inform and train laboratory faculty, staff, and student workers about chemical safety as required by the Chemical Hygiene Plan; and
 5. Conduct annual internal safety inspections of labs for health and safety and submit written reports of the inspection to the department chairs.
- d. The Safety Committee of the College of Natural and Health Sciences** shall consist of the Chemical Safety Officer, the Chemical Hygiene Office, the Department of Chemistry Laboratory and Stockroom manager, and one representative from each department covered by the Chemical Hygiene Plan. The representatives are appointed by the Department Chairs. The committee shall:
1. Assist the Chemical Safety Officer with the annual review of the Chemical Hygiene Plan;
 2. Provide technical advice to the laboratory supervisors, faculty, and workers concerning requirements of the College's Chemical Hygiene Plan;
 3. Make recommendations to the Chairs and Dean for safety improvements;
 4. Serve as a liaison between safety personnel and the departments to improve communication; and
 5. Assist the Chemical Safety Officer with annual safety evaluations of department laboratories.
- e. The Chemistry Laboratory and Stockroom Manager** shall:
1. Provide access to MSDA sheets on request;
 2. Maintain the chemical inventory and records of distribution of chemicals to the laboratories for the Department of Chemistry;
 3. Produce and distribute guidelines and information about waste management to faculty and staff;
 4. Maintain the Waste/Used/Excess Chemical Area until periodic waste pickup is arranged;
 5. Assist faculty with issues relating to chemical storage, handling, disposal, labeling, and student workers about safety issues; and
 6. Assist the Chemical Safety Officer in conducting annual internal inspections of laboratories for health and safety.
- f. Faculty and Staff (including teaching and research assistants)** are in charge of supervising laboratories (referred to as lab supervisors throughout this document) shall:
1. Comply with all the requirements of this Plan and follow accepted safety practices;
 2. Ensure that all laboratory workers receive training on the Chemical Hygiene Plan and other special hazards encountered in a specific laboratory;

3. Ensure that all laboratory workers comply with this Plan and follow accepted safety practices;
4. Identify hazards unique to particular laboratories, develop written procedures to address safety issues pertinent to these special hazards, and add these to the College Chemical Hygiene Plan;
5. Know the chemicals stored and used in a particular laboratory and the hazards associated with these chemicals;
6. Maintain a current inventory of chemicals present in a laboratory; and
7. Provide access to MSDA sheets;
8. Ensure that safety equipment and supplies are present and functional and that laboratory workers use this equipment as needed;
9. Request funds needed for specific health and safety improvements;
10. Report significant accidents or incidents to the Department Chair;
11. Ensure that the information on laboratory identification signs is current;
12. Correct any safety deficiencies identified during inspections.

g. Laboratory Workers shall:

1. Comply with all health and safety standards and rules;
2. Report all hazardous conditions to the laboratory supervisor;
3. Wear or use protective equipment;
4. Report any suspected job-related injuries or illnesses to the laboratory supervisor and seek treatment immediately;
5. Refrain from the operation of any equipment or instrumentation without proper instruction and authorization;
6. Remain aware of the hazards of the chemicals in the laboratory and handle hazardous chemicals safely; and
7. Request information and training when unsure how to handle a hazardous chemical or procedure.

Appendix 1 provides a list of current administrative personnel.

V. Standard Operating Procedures

The Laboratory Standard requires that operating procedures relevant to safety and health considerations be developed by the employer and followed by the employee for laboratory work involving the use of hazardous materials.

The Chemical Hygiene Plan includes a minimum set of procedures for laboratory operations and for handling hazardous chemicals in laboratories at Virginia State University. Individual laboratories or research groups are required to develop more detailed procedures as their situations warrant. These procedures must be written, added to the College Chemical Hygiene Plan, and made available to laboratory workers. Acceptable laboratory safety references such as those listed in the OSHA Lab Standard may be adopted in whole or may be useful in developing additional procedures. *In all situations, individual faculty or staff will be*

responsible for enforcing adequate safety and hygiene measures in laboratories they supervise. If necessary, additional assistance from the College of Natural and Health Sciences Safety Committee is available. The following standard operating procedures apply to all laboratories in the College of Natural and Health Sciences.

a. General Laboratory Operations and Conduct

1. All laboratory employees, students, and visitors in laboratories **MUST** wear appropriate safety glasses, goggles, or face shields at all times where hazardous chemicals are stored or handled. Safety glasses with side shields or goggles are required when chemical splashes are possible.
2. Both OSHA and the American Chemical Society have revised their guidelines on contact lenses. Contact lenses may be worn in the laboratory, but they should not be considered eye protection devices. Safety glasses or splash goggles shall be worn over the lenses.²
3. All laboratory employees, students, and visitors must wear or use additional personal protective equipment as appropriate and needed.
4. Eating, drinking, smoking, and the application of cosmetics are prohibited in areas where hazardous chemicals are used.
5. Horseplay, practical jokes or other inappropriate and unprofessional behavior in the laboratory setting is forbidden. Avoid distracting or startling any other workers.
6. Food intended for human consumption must not be stored in the same refrigerator with chemicals, biohazards, or radioactive materials.
7. Hands should be washed frequently throughout the day, before leaving the lab, after contact with any hazardous materials, and before eating.
8. Loose hair and clothing must be confined. Shoes are to be worn at all times in the laboratory. Closed toe shoes must be worn in laboratories where hazardous materials will be handled.
9. Materials should never be pipette by mouth.
10. Laboratory operating continuously or overnight must take into consideration an unexpected interruption in utility services (i.e. electricity, water, and gas). Plans must be made to avoid hazards in case of such failures. If necessary, arrangements for routine inspection of the operations are to be made and, in all cases, the laboratory lights should be left on and an appropriate sign posted at the door. The identity of the materials being used, hazard labels, correct action to

take in case of emergency, and the phone number of the contact person should be included.

11. Laboratory areas shall be kept clean and uncluttered. This will help prevent spills, breakage, injuries, unnecessary contact with chemicals, and accidents.
12. Spills must be cleaned immediately according to the guidelines provided in Section XI-b of this Chemical Hygiene Plan.
13. Access to exits, aisles, and safety equipment shall not be obstructed in any way with equipment, supplies, furniture, etc.
14. Proper equipment in good operating condition should be used for all laboratory operations. The integrity of containers should be checked. If found to be damaged or leaking, the material should be transferred to an acceptable container. The Department Laboratory and Stockroom manager is available for assistance.
15. Laboratory workers are NOT allowed to remove chemicals from the laboratory or stockrooms for personal use.
16. Pregnant workers or students should inform the Department Chair of their pregnancy. The student can be provided with information regarding hazardous materials that will be encountered during the course of the laboratory work. The decision about whether or not to continue to work in the laboratory will be made by the student and her physician. A written note from the physician is required to continue in the laboratory.
17. No one shall work in the laboratory while under the influence of alcohol or drugs. Any person suspected of being under the influence of alcohol or drugs shall be dismissed from the laboratory setting. Grade ramifications due to such a dismissal is entirely the responsibility of the faculty member overseeing the laboratory.

b. Hazardous Materials Storage

1. Chemicals are stored by chemical compatibility. Oxidizers are separated from organics, air/water reactive must be kept dry, and cyanides should be stored away from acids. More information is available from reference 3.³
2. Hoods should not be used for long-term storage of chemicals or chemical waste.
3. Volatile toxic substances must be stored in cabinets designed for storage of such substances. When volatiles must be stored in a cooled atmosphere, flammable refrigerators or similar specially designed equipment must be used.
4. Laboratory refrigerators used for storing or cooling flammable liquids will be in compliance with NFPA45 – Fire Protection for Laboratories Using Chemicals, section 9.2.2.2 and A.9.2.2.2. Self-defrosting refrigerators, either modified or

unmodified, will not be used for storing or cooling flammable liquids. General purpose refrigerators are not to be used for the storage of flammable or reactive liquids or solids. They shall be labeled “Not for Storage of Flammable or Reactive Liquids or Solids.” Refrigerators used for storage of chemicals must not be used to store food, beverages, or cosmetics and shall be labeled “Not for the Storage of Food, Beverages, or Cosmetics.”

5. Pressurized gas cylinders must be stored in well-ventilated areas with their protective caps screwed on and the cylinder secured (strapped or chained in an upright position) to reduce the chance of the cylinder being knocked over. Cylinders should not be stored near heat or high traffic areas. Flammable and oxidizer gases should not be stored together. Empty cylinders should be stored separately from full cylinders. Large cylinders should be stored in an approved gas cylinder storage area. Gas cylinders must be transferred using appropriate handcarts. Extremely toxic gases (hydrogen sulfide, chlorine, and arsine) should not be moved through regular exit corridors, particularly during business hours. Always treat every cylinder as if it were full and handle them with the appropriate care.
6. Substances with an NFPA flammability rating of 3 or 4 must be stored in approved flammables cabinets. No more than 500mL (total) of flammable material should be on a laboratory benchtop at any given time.

c. Hazardous Material Handling

1. Extremely hazardous materials should not be used on open laboratory benches.
2. The use of plastic-coated bottles or bottle carriers for transporting chemicals which are in regular glass containers is encouraged. Caps should be checked and closed securely. Chemical containers should not be stored in hard-to-reach areas.
3. Transfers between containers should be done with extreme care.
4. Concentrated acids should always be added to water.
5. Containers that hold more than five (5) gallons (US) of a flammable material must be grounded when transferring the liquid.
6. Perchloric acid should not be used in the laboratories at Virginia State University because there are no fume hoods available designed for perchloric acid use.

d. Hazardous Material Disposal – General Guidelines

1. Water insoluble materials should not be disposed of in laboratory drains.
2. All waste must be placed in appropriate containers and labeled accordingly with the identity of the waste(s), the approximate amount of all materials, the date the

waste was added, and the name of the person adding the waste. Each container must be marked.

3. Waste must be segregated by type. Mixing of waste must be avoided as it complicates disposal. The Laboratory and Stockroom Manager must be contacted before a waste container is created.
4. Mixing chlorinated and non-chlorinated solvents in waste containers must be avoided.
5. Sharps (needles and glass) must be disposed of in an approved labeled container. Glass objects and other potentially sharp objects shall not be disposed of in common office refuse. Containers should not be over filled and must be labeled and sealed for proper handling and disposal.
6. Biohazardous waste must be placed in an approved container clearly labeled for such waste.
7. All waste containers must be approved by the University Health and Safety Office prior to pickup. Departments will bear the cost of characterization and disposal of unmarked hazardous waste.

e. Labels and Signs

1. All containers must be labeled. All labels must be written in legible English. The label should contain the chemical/product name; date prepared, received, or opened; name of the user; and hazard information. The NFPA label is used to provide this information in the College of Natural and Health Sciences.
2. Labels on incoming containers must not be removed or defaced.
3. All substances which can form explosive peroxides (ethers) and other chemicals which can become unstable over time (e.g. picric acid) must be dated when received and opened. These materials should be used promptly and disposed of appropriately.
4. Each laboratory door must be legibly marked with emergency contact information including an emergency contact name and phone number.

f. Safety Showers and Eye Wash Stations

1. Safety showers and eye wash stations shall be available in or near all laboratories where hazardous materials are in use.

2. Eyewashes should be tested weekly by the Laboratory and Stockroom Manager. The station should be flushed for several minutes monthly to remove materials or organisms damaging to the eye.
3. Safety showers should be tested periodically.

g. Fume Hoods and Other Engineering Controls

1. All fume hoods at Virginia State University should have face velocities between 80 and 150 fpm with the sash at working height. As a general rule hoods should not be operated with the sash fully open. The sash should be closed when the hood is not in use. Hoods should be regularly inspected.
2. Fume hoods with face velocities lower than 80 fpm must be marked with a sign indicating that the hood should not be used for chemical manipulation. A work order to repair the hood should be processed as soon as possible.
3. It should be realized that a properly working hood does not provide absolute containment or protection from materials in the hood; however, it does provide reasonable protection if basic work practices are followed as below:
 - Operations that generate air contaminants should be conducted inside a hood;
 - All apparatus should be 6 inches back from the face of the hood;
 - Your head should not enter the hood;
 - Hoods are not to be used for waste disposal;
 - Excessive storage of chemicals or apparatus should be avoided;
 - The hood should be on and tested periodically during use;
 - The slots in the hood baffle should be free of obstructions;
 - Foot traffic in the front of the hood should be minimized;
 - The sash should only be removed for setup of apparatus and should be replaced prior to use;
 - Electrical receptacles should not be placed in the hood;
 - An appropriate barricade should be used if there is potential for an explosion;
 - If the sash is supposed to be closed for a particular operation, the hood should be labeled with the appropriate closure point indicated; and
 - All fume hoods should have spill protection lips at the front of the hood and near the sashes.

VI. Controlling Chemical Exposures

The Lab Standard requires the employer to determine and implement control measures to reduce employee exposure to hazardous chemicals. Particular attention must be given to the control measures for chemicals that are known to be extremely hazardous. There are three major routes of entry for a chemical to enter the body: inhalation, absorption, and ingestion. The controls for prevention of these various routes of entry include engineering controls, personal protective equipment, and administrative controls.

a. Inhalation

Inhalation of chemicals is the most common entry a chemical can take to enter the body. The best method for reducing inhalation risk is using a less hazardous material in place of a more hazardous one. If substitution is not practical, engineering controls (ventilation) should be used to lessen the chance of exposure. The use of properly functioning local exhaust ventilation such as fume hoods, biological safety cabinets, and vented glove boxes is often required to minimize exposure to hazardous chemicals. Dilution ventilation may be used to reduce exposure to nonhazardous nuisance odors. For extremely toxic chemicals (poison gases as classified by State or Federal agencies, i.e. arsine, phosgene) the use of closed systems, vented gas cabinets, fail-safe scrubbing, detection, or other more strict controls may be required.

If neither substitution nor engineering control is practical, the use of personal protective equipment, such as dust masks or respirators, may be required to reduce inhalation exposures. If respirators are worn by laboratory employees, requirements of the OSHA Respirator Standard (1910.134) must be met. A written respirator program must be implemented and approved by University's Chemical Safety Officer. Currently, there are no laboratories at Virginia State University that require respirators.

In addition to the controls previously discussed, the following general guidelines should be observed to reduce exposure to hazardous chemical risk:

- Minimum exposure time to hazardous materials
- Restricted access to an area where a hazardous chemical is in use
- Maintenance of proper signs on laboratory doors to indicate special hazards are inside the laboratory.

b. Absorption

To reduce the risk of a hazardous chemical from entering the body via skin or eye contact, engineering controls include substitution and ventilation as described earlier. The most obvious means of preventing skin and eye contact is by wearing personal protective equipment such as eye protection, face shields, gloves, appropriate shoes, lab aprons, lab coats, and other equipment specific to the chemical hazard. Since the chemical resistivity of the different personal protective equipment varies significantly, the lab supervisor should consult references to be certain the protective equipment is resistant to the particular chemical in use. Safety showers and eye wash equipment is required where corrosive chemicals are used. This equipment must be prominent and not obstructed.

c. Ingestion

Ingestion of chemicals is the least common entry into the body. However, it should be noted that a laboratory worker can easily ingest chemicals via contaminated hands

if they are not washed thoroughly and frequently, especially prior to eating, smoking or putting hands into the mouth. Some controls for prevention of ingestion include: 1) engineering controls such as isolation of the hazardous substance to minimize contact (e.g. glove box use); 2) use of personal protective equipment (gloves); and 3) operational and administrative controls such as avoidance of mouth pipetting, and encouraging good personal hygiene.

VII. Employee Information and Training

a. Information

All individuals who work in laboratories where exposure to hazardous chemicals must be informed about the hazards of chemicals and equipment present in their work area. This information and training must be provided before initial assignment and before new exposure situations arise. Equipment necessary for the safe handling of hazardous substances must be provided by the employer. **It is the responsibility of the Lab Supervisor to ensure that all laboratory workers have been properly trained.** The College of Natural and Health Sciences Chemical Safety Officers shall provide general training materials concerning laboratory safety and the Virginia State University Chemical Hygiene Plan. However, training specific for the particular lab where an employee is assigned is the responsibility of that employee's supervisor. The laboratory supervisor must maintain a written record showing the content of the training, the date, and the names of the trainer and employees present. The supervisor must determine the frequency of refresher information and training.

b. Training

Laboratory workers must be familiar with and adhere to the requirements of the Chemical Hygiene Plan, other specific laboratory safety guidelines developed by the laboratory supervisor, Virginia State University requirements, and other relevant regulatory requirements.

1. General laboratory worker training must include information on the following:

- Location and availability of the OSHA Lab Standard
- Location and availability of the Chemical Hygiene Plan
- Methods available to obtain reference materials on chemical safety (including MSDS)
- Handling hazardous waste
- The work practices, personal protective equipment, and emergency procedures to be used to ensure that the employee may protect himself/herself from overexposure to hazardous chemicals

The manufacturer's material safety data sheets will generally contain much of the information needed to comply with the information and training requirements of the OSHA Lab Standard. Laboratory supervisors and employees should

understand the relevant MSDS and/or other comparable literature on the hazardous chemicals which are used or stored in their laboratory. The employee's supervisor must provide additional training for specific lab hazards.

Copies of MSDS may be obtained from the chemical supplier or on the Internet. Individual departments are strongly encouraged to maintain their own files of reference materials.

2. Special Hazards

Special hazards apply to specific laboratories and should be identified by the laboratory supervisor, who is responsible for training the workers in that laboratory on these special hazards and for maintaining the documentation of this training. The training should include information on the following:

- The permissible exposure limits for OSHA regulated substances
- Signs and symptoms associated with exposure to the hazardous chemical
- The detection methods that may be used to detect the presence or release of a hazardous chemical

VIII. Prior Approval

The responsibility for approval of the acquisition and use of toxic chemical agents rests with the laboratory supervisor. Some materials including toxic compressed gases, radioactive materials, and certain recombinant DNA and biohazards require internal or external approval at various levels. The laboratory supervisor should contact the Chemical Safety Officer regarding approval for use of highly hazardous materials or operations.

IX. Medical Consultation

An opportunity for laboratory workers to receive medical consultation must be provided if an employee develops any symptoms thought to arise from chemical overexposure or after an event such as a major spill, leak, or explosion which may have resulted in an overexposure.

These suspected or actual exposures requiring medical evaluation can and should be treated as a regular Workers Compensation claim. The injured employee must fill out an Accident – Occupational Injury/Illness Report Form and go to an appropriate medical facility (e.g. occupational medicine clinic, employee health qualified outside physician, etc.) for treatment. Following notification of overexposure, arrangements for an appropriate medical examination must be completed before the exposed individual may return to work.

Any medical examination required by this Plan must be provided without cost to the employee, without loss of pay, and in a reasonable time and place. Records of any medical examination will be maintained at the medical facility providing service or with appropriate medical personnel at Virginia State University.

X. Special Provisions for Select Carcinogens, Reproductive Toxins and Acutely Toxic Chemicals

The laboratory supervisor must make provisions for additional employee protection for work with particularly hazardous substances. These include select carcinogens, reproductive toxins, and substances which have a high degree of acute toxicity. The Chemical Safety Committee can provide information about these substances. The following provisions must be included:

1. Establishment of a designated area
2. Use of containment devices such as fume hoods or glove boxes
3. Procedures for safe removal of contaminated waste; and
4. Decontaminating procedures

In addition to the general safety guidelines mentioned in the first section and throughout the Plan, special precautions are needed when handling genotoxins, reproductive toxins, and chemicals with a high degree of acute toxicity. Minimum guidelines that should be observed are listed below. The lab supervisor should ensure that these and other precautions designed to minimize risk of exposure to these substances are taken.

1. Quantities of these chemicals stored are minimized
2. Quantities of these chemicals used are minimized
3. This applies to solutions and mixtures as well
4. Work with these materials must occur in a certified functioning hood, biologically approved safety cabinet, and ventilated glove box, sealed system or other designated system that minimizes exposure.
5. Exhausts from such systems may require scrubbing or treatment prior to release into the atmosphere. Work with these materials must be done within the OSHA permissible exposure limits.
6. Compressed gas cylinders containing acutely toxic chemicals (arsine, chlorine, and nitrogen dioxide) must be kept in a well ventilated area.
7. Ventilation efficiencies for systems where work with these materials is conducted must be evaluated periodically as determined by the laboratory supervisor.
8. The area in a laboratory for working with these materials must be designated and signed with an appropriate hazard warning. The area may be an entire laboratory, an area of the laboratory or a particular device (fume hood or glove box). The designated area should be marked with a **DANGER, specific agent, AUTHORIZED PERSONNEL ONLY** or comparable warning sign.
9. Bio-safety level 3 or 4 requires that an entire laboratory be designated.
10. All workers in a laboratory designated for use with these materials must be trained regarding the effects of these substances as well as symptoms due to overexposure, regardless of whether or not they work with the materials themselves. Training to ensure safe handling and storage is required for those who use these materials. This training is the responsibility of the laboratory supervisor and must be completed prior to use of any of these materials.

11. Laboratory workers must have access to appropriate protective equipment and clothing and must be trained in the use of the protective equipment.
12. Detection equipment may be required in laboratories where chemicals (especially toxic gases) with a high degree of acute toxicity are used.
13. The working area must be appropriately decontaminated at regular intervals determined by the laboratory supervisor. The interval may vary between one day and six months depending upon the frequency of use and the level of the hazard.
14. Special precautions to avoid release and exposure must be utilized. For instance, volatile substances must be kept cool and contained; gases should have properly functioning valves, regulators, containment which can withstand a pressure increase, and appropriate piping; and dispersive solids should be kept in closed containers, used in places with minimum air currents and appropriate contact materials should be used to avoid static charging.

XI. Emergencies

a. Planning

Planning for emergencies is an essential component of laboratory safety. Laboratory workers should be equipped with the information and ability to assess risks from a small spill or release of a chemical or fire. This information and ability are obtained through training. The most important aspect of this training is providing the ability to differentiate between an incidental situation and an emergency.

An incidental release occurs when it is determined that no imminent serious health or safety hazard to the laboratory workers or university property exists. Lab workers should prepare for and handle their own incidental spills and releases. Absorbent materials should be made available in all laboratories for small spills.

Serious emergencies are those posing an immediate and serious risk of injury or illness to laboratory workers. These could include:

1. Release of large quantities of toxic substances
2. Release of high concentrations of toxic substances
3. Fire or explosion hazard

b. Response for Selected Emergencies

Laboratory personnel should respond to serious emergencies only **if they are formally trained or certified to respond to such situations**. Personnel are expected to respond to incidental situations.

1. Small fires, small volume chemical spills

Small localized fires can be put out by smothering the fire with a fire-resistant material. Slightly larger fires can be extinguished by a person trained in the use and operation of a fire extinguisher.

Minor spills of chemicals should be cleaned up immediately by laboratory personnel. Absorbent materials are available in all laboratories to absorb acidic, basic, or organic spills. Absorbent towels are also available. The person cleaning the spill should avoid contact with the hazardous material. The Laboratory and Stockroom Manager will assist with disposal of the spill-cleanup materials.

2. Large fires or Release of a Large Volume of Toxic Material

If personnel judge the fire is too large to be brought under control without increased danger to laboratory personnel or property, emergency personnel should be contacted. The order to the following actions are dependent upon the emergency conditions; layout of the laboratory; time of day; number of people present; and the location of the emergency relative to the doors and alarm stations or telephones.

- Alert personnel in the immediate vicinity
- Call (804) 524-5411 from a safe location. Remain on the line until all necessary information has been given to the emergency responder
- Confine the fire or emergency if possible without endangering yourself
- Shut hood sash if possible
- Close doors to prevent the spread of vapors, gases, or fire
- Evacuate the hazardous area or the building

3. Minor burns or injuries

Minor burns or injuries are those that can be treated by the injured person. Standard first aid treatment could include running cold water over a burn or the application of a band-aid to a small cut.

4. Serious non-life threatening burns or injuries

If the burn or injury is serious enough that self-medication is insufficient, the person should seek medical attention. The student health center is located in Memorial Hall. Another person must accompany the injured person to Memorial Hall.

5. Life-threatening burns, injuries, or illness

In situations where burns or injuries are life threatening, medical personnel should be summoned to the laboratory by calling **(804) 524-5411**. Laboratory personnel should take only those actions that will prevent further harm to the injured person. No medical treatment should be administered unless the person is trained and certified to perform treatment.

If a person is on fire, the following actions can be taken:

- Stop the person from running.
- Drop the person on the floor.
- Roll the person to snuff out the flames.

- Cool the person. Remove smoldering clothing. Use cold water or ice packs to cool burns and minimize further injury.
- Get medical assistance immediately.

6. Chemical exposure

If a person splash chemicals on himself or herself (eyes and/or body), laboratory personnel should assist the injured individual and move the person to a safety shower or eyewash. Immediate flushing with water for at least 15 minutes is the most important emergency response. Medical assistance must be sought immediately.

XII. Inspections and Housekeeping

a. Housekeeping

1. Laboratories should be free of clutter. Work areas should be cleaned after every operation and at the end of the work day.
2. Safety showers, eyewash fountains, and fire extinguishers must be free of obstructions. Access to emergency exits must be clear at all times.
3. Circuit breaker panels must have an unobstructed clearance.
4. The floors shall be kept clean and free of slip hazards.
5. Old containers, compromised containers, and solid chemical wastes should be disposed of immediately.
6. The laboratory supervisor is responsible for the cleaning and immediate cleanup of spills.
7. Custodial staff will perform routine cleanup – waste baskets will be emptied daily and floors will be swept.
8. Custodial staff will not routinely clean lab bench tops without a request from the laboratory supervisor and his/her assurance that no hazardous materials are present.
9. Custodians will NOT clean up spills of any hazardous materials.

b. Inspection and Maintenance

1. Temperature control and over-temperature shutoff devices on heating equipment should be tested periodically to ensure proper operation as per the manufacturers directions.
2. All automatic shutoff devices shall be tested periodically.
3. Explosion shields and isolation devices should be visually inspected for cracks or damage before each use
4. Laboratories shall be inspected yearly by the Chemical Safety Officer.

XIII. Records

The following records shall be maintained:

- Safety training records by the Chemical Safety Officer.

- Safety training records for special hazard training by the Laboratory Supervisor
- Annual inspection reports of the laboratories maintained by the Chemical Safety Officer
- A departmental list of all personnel who have after hours building access. The list must contain emergency contact information for each person.
- Copies of all incident reports shall be held in the department office.

¹The OSHA Laboratory Standard (29 CFR 1910.1450): <http://www.osh.gov>

²Safety in *Academic Chemistry Laboratories*, Volume 1 and 2, American Chemical Society, 7th Edition, 2003.

³Chemical Reactivity Worksheet is a free program available about the reactivity of substances or mixtures of substances at <http://response.restoration.noaa.gov/chemaids/react.html>.

Appendix 1

Emergency Contact Personnel

<u>Name and Title</u>	<u>Contact Number</u>
Dr. Victor Vilchiz College Chemical Safety Officer	(804)524-5574
Dr. Grace Ndip Chair of the Department of Chemistry	(804) 524-5438
Mr. Michael Hickman Virginia State University Safety Officer	(804) 524-5612
Dr. Larry Brown Dean, College of Natural and Health Sciences	(804) 524-1162
