

CHEMICAL HYGIENE PLAN

**LABORATORY SECTION
4405 REEDY CREEK ROAD
RALEIGH, NC 27607**

NORTH CAROLINA DIVISION OF WATER QUALITY

2012 REVISION

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1 CHEMICAL HYGIENE PLAN OVERVIEW

In the daily performance of duties in the Laboratory Section, it may be necessary to work with hazardous chemicals and equipment. This may include, at least:

- flammable, corrosive, explosive, carcinogenic or toxic chemicals
- biological hazards
- Physical hazards such as high pressure gas cylinders, temperature extremes or high voltage equipment

This plan sets forth the Division of Water Quality's (DWQ) safe laboratory practices. Details of the safe use of chemicals and equipment are included in the standard operating procedure for each unit of the Laboratory Section. All Laboratory Section employees are required to be familiar with this Chemical Hygiene Plan (CHP). As with any workplace in DWQ, know:

- The nearest exit, the evacuation route to that exit and the outside assembly area.
- The location of the unit safety equipment.
- The locations of fire alarm pull stations and fire extinguishers.
- The location of the unit Material Safety Data Sheets (MSDS).

2 CHP APPLICABILITY

The OSHA standard that governs use of or handling of hazardous chemicals in a laboratory setting is the Occupational Exposure to Hazardous Chemicals in Laboratories lab standard 29 CFR 1910.1450. It only applies to laboratory use of hazardous chemicals in which **all** of the following criteria are met:

- Procedures using chemicals are carried out using containers that are easily handled by one person (i.e., manipulations are carried out on a laboratory scale).
- Multiple chemical procedures or multiple chemicals are used.
- Operations involved are not part of a production process, nor in any way simulate a production process.
- Protective practices and equipment are available and commonly used to minimize the potential for employee exposure to hazardous chemicals.

Below is a general summary of the elements of the Chemical Hygiene Standard:

1910.1450(e) Chemical Hygiene Plan - General

(1) Where hazardous chemicals as defined by this standard are used in the workplace, the employer shall develop and carry out the provisions of a written Chemical Hygiene Plan which is:

(i) Capable of protecting employees from health hazards associated with hazardous chemicals in that laboratory and

(ii) Capable of keeping exposures below the limits specified in paragraph(c) of this section (29 CFR part 1910, subpart Z).

(2) The Chemical Hygiene Plan shall be readily available to employees and employee representatives.

(3) The Chemical Hygiene Plan shall include each of the following elements and shall indicate specific measures that the employer will take to ensure laboratory employee protection;

(i) Standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals

(ii) Criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices; particular attention shall be given to the selection of control measures for chemicals that are known to be extremely hazardous

(iii) A requirement that fume hoods and other protective equipment are functioning properly and specific measures that shall be taken to ensure proper and adequate performance of such equipment

(iv) Provisions for employee information and training as prescribed in paragraph (f) of this section

(v) The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from the employer or the employer's designee before implementation

(vi) Provisions for medical consultation and medical examinations in accordance with paragraph (g) of this section

(vii) Designation of personnel responsible for implementation of the Chemical Hygiene Plan including the assignment of a Chemical Hygiene Officer, and, if appropriate, establishment of a Chemical Hygiene Committee

(viii) 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. Specific consideration shall be given to the following provisions which shall be included where appropriate:

- Establishment of a designated area*
- Use of containment devices such as fume hoods or glove boxes*
- Procedures for safe removal of contaminated waste*
- Decontamination procedures.*

(4) The employer shall review and evaluate the effectiveness of the Chemical Hygiene Plan at least annually and update it as necessary.

3 RESPONSIBILITIES OF EMPLOYEES

The Laboratory Section of DWQ fully intends to comply with 29 CFR 1910.1450, which is known as the Occupational Exposure to Hazardous Chemicals in Laboratories standard and any amendments specific for the State of North Carolina. Every Laboratory Section employee has the responsibility to ensure the policies as set forth in this program are carried out. To ensure this goal, the following responsibilities are assigned:

3.1 Laboratory Director/ Section Chief

The overall responsibility for Laboratory operations rests with the Laboratory Director. The Laboratory Director shall:

- Assist the Chemical Hygiene Officer and the Division Safety Consultant in developing long range safety and health goals for the Laboratory Section employees.
- Provide the funding necessary to achieve the safety and health goals.
- Set an example for safety at all times while in the employ of this Division.

3.2 Chemical Hygiene Officer

The Chemical Hygiene Officer (CHO) is the primary person responsible for ensuring the CHP is implemented throughout the Laboratory Section. The major responsibilities of the CHO are to:

- Provide technical assistance in complying with the Chemical Hygiene Plan and answering questions concerning safety for employees.
- Assist the Branch and Unit Supervisors in developing appropriate safety precautions and procedures.
- Develop and maintain a system of collection and disposal of chemical wastes and monitor the Chemical Waste Disposal program.
- Provide to the Division Safety Consultant an analysis of any chemical spill or accident within 48 hours of the incident, and develop proposed changes in procedures or policies to improve employee safety and decrease the risk of similar occurrence.
- Maintain a documentation program that includes all accident, injury, incident, inspection, and hood maintenance records.

In conjunction with the Division Safety Consultant, the CHO will:

- Determine the extent of any complaint of “overexposure” and determine when an exposure assessment is warranted.
- Establish long range safety and health performance goals, and submit an annual report to the Division Director or his representative, through the Laboratory Section Chief, indicating achievements, identification of major problem areas, annual goals and objectives, funding needs, and long range plans for improvement.
- Coordination of safety training for Laboratory Section employees.
- Perform routine and surprise inspections of the Laboratory facilities.

3.3 Branch and Unit Supervisors

The Branch and Unit supervisors are responsible for ensuring this Plan is carried out at the work level. At a minimum, these supervisors are responsible for:

- Providing safe working conditions for all Branch/Unit employees.
- Knowing and implementing the safety and health standards or regulations applicable to the Branch or Unit.
- Investigating any employee reports of unsafe working conditions or practices.
- Investigating and reporting accidents or incidents promptly (by the end of the work shift) to the Laboratory Director, the Laboratory Section Safety Committee, and the Division Safety Consultant.
- Ensuring that personal protective equipment is available as needed and ensuring that users are adequately trained in its use, care, and storage.

3.4 All Employees

While in the employ of the Division of Water Quality, each employee has a responsibility to work in as safe a manner as possible. In addition, all employees will:

- Refrain from any unsafe act that might create dangerous conditions.
- Use prescribed safety equipment and personal protective equipment as indicated in the Branch, Unit or Group standard operating procedures.
- Report **ANY** unsafe condition or act of a coworker to the immediate supervisor or to the Division Safety Consultant.

4 ACCIDENT / INCIDENT REPORTING

Any occupational injury, accident or near miss incident is to be reported immediately to the employee's supervisor. The employee or supervisor should notify the Chemical Hygiene Officer of the incident. Failure to report an occupational injury within 30 days may disqualify the employee for benefits associated with the Worker's Compensation insurance carrier for the State of North Carolina.

Depending on the severity of the accident or injury, it may be necessary to call for outside emergency help. To call for local, outside emergency services, dial:

9-911

If there are any doubts about the severity of an injury or accident, do not hesitate to call for outside emergency help. If necessary, begin to initiate a building evacuation.

Information regarding accident and injury reporting procedures, as well as Worker's Compensation, can be found on the Division of Water Quality's safety web site:

<http://portal.ncdenr.org/web/wq/admin/bog/safety/safety>.

In order to maintain an effective communication system within the Division of Water Quality, and to ensure compliance with the North Carolina Occupational Safety and Health reporting requirements for workplace accidents and injuries, the following procedures are to be used in the event of an occupational accident, occupational injury, or an occupational fatality.

4.1 Non- Fatal Accidents and Injuries

1. **ALL INJURIES, no matter how minor**, must be reported immediately to the employee's supervisor. The supervisor should assist in determining the severity of the injury and whether professional medical attention is warranted.
2. For minor injuries not requiring professional medical attention, first-aid kits are available in the laboratory. The Laboratory Section's Safety Officer can assist with treatment of minor injuries.
3. If an injury is serious or life-threatening, contact the local Emergency Medical Service (EMS) by dialing 9-911. If there is **any** doubt as to the severity of the injury, please contact EMS personnel. The person contacting EMS should provide the physical address of the laboratory building, which is 4405 Reedy Creek Road, as well as the nature of the accident and/or injury. Remain on the telephone line until otherwise instructed by the EMS operator.
4. If the injury is not serious or life-threatening, but requires professional medical attention, transport the employee directly to one of the following facilities:
 - 4.1 **Rex Hospital**, emergency room, 4420 Lake Boone Trail, telephone: 784-3038;
 - 4.2 **Rx Urgent Care**, 3100 Blue Ridge Road, Suite 103, telephone: 719-2250.
 - 4.3 **Accent Urgent Care**, 2406 Blue Ridge Road, Suite 190, telephone 789-4322.

Notify the facility that the injury is a Worker's Compensation case.

Only transport an injured employee if it will not aggravate the injury. If the movement or transport of an injured employee might aggravate the injury, contact EMS and request an ambulance.

5. For occupational injuries requiring professional medical attention, the injured employee's unit supervisor must notify the Division Safety Consultant of the injury within 24 hours of the incident.
6. If an employee requires professional medical attention for an occupational injury, several forms must be completed. These forms, listed in the sections below, are available at the Division's Injury and Illness webpage, located at the following internet address: <http://portal.ncdenr.org/web/wq/admin/bog/safety/incidentreports>. Note that the employee and supervisor may keep copies of these forms for their records.
7. If the employee requires professional medical attention, the employee or an accompanying co-worker should take the following form with them to the medical facility:
 - 7.1 Take two copies of the **Medical Authorization and Pharmacy** form. One copy should be given to the attending physician. The physician should provide the requested physical capabilities information on the form. The completed form should be submitted to the employee's supervisor and the Division Safety Consultant.

The second copy is for a pharmacy, if needed, and includes a list of authorized pharmacies.
 - 7.2 A copy of the injured employee's Emergency Notification Form (which is on file with the employee's unit supervisor).
8. The injured employee's unit supervisor should fill out the following forms within 24 hours of the accident or injury:

- 8.1 The **Incident Investigation** form documents the injury, causes, and corrective actions.
- 8.2 The **Industrial Commission Form 19** form (titled “Employer’s Report of Employee’s Injury or Occupational Disease to the Industrial Commission”) is required for Workman’s Compensation. The Division Safety Consultant fills out questions 11, 15, 17, and OSHA 301 information on the form.
- 8.3 The **Leave Options** form should be completed if the injury results in days missed from work. The unit supervisor should complete page 2 of the form (after the injured employee completes page 1).

The signed, original copies of these forms should be submitted to the Laboratory Section Chief, then to the Division Safety Consultant. Electronic copies of the forms can be initially delivered to the safety office by email, but must be followed by the original hard-copies (delivered by hand or interoffice mail).

9. The injured employee should, as soon as possible, complete the following forms:
 - 9.1 The **WC Release of Information** form. The employee should submit the signed original of the form to the Division Safety Consultant.
 - 9.2 If the injury results in any days away from work, the **Employee Statement** form must be completed by the employee. The employee is to provide a statement of how the injury occurred and how the initial days away from work will be counted. The form should then be submitted to the employee’s unit supervisor, who should fill in the appropriate blocks on the second page of the form. The signed and dated form must then be forwarded to the Division Safety Consultant.
 - 9.3 The **Leave Options** form should be completed if the injury results in days missed from work. The injured employee should complete page 1 of the form and submit the form to their unit supervisor.
10. If the injury requires time away from work, please refer to the Division’s Injury and Illness Reporting webpage. The section titled “Incident Follow-up and Employee Return Work” has information regarding employee and supervisor responsibilities regarding keeping track of days away from work, return to work, and any job restrictions due to the injury.
11. Following an accident or injury, the unit supervisor and the Laboratory Safety Committee should investigate the incident. The investigation should determine and document the cause of the accident/injury, and whether any modifications to work procedures need to be instituted to reduce the chances of repeat incidents.
12. Reportable accidents and injuries are to be entered into the Division of Water Quality’s OSHA 300 form, which is maintained by the Division Safety Consultant.
13. The OSHA 300 form for the Laboratory Section, for the preceding year, is to be posted on the employee bulletin board from February 1 to April 30. The Section-specific OSHA 300 form will be provided by the Division Safety Consultant. Contact the Safety Consultant for more information.
14. For more information, please refer to the NCDENR safety website at the following links:
[\[http://portal.ncdenr.org/group/srm/home.\]](http://portal.ncdenr.org/group/srm/home.) for the intranet portal webpage. Use employee NCID username and password to access the portal webpage.

4.2 Fatal Accidents and Multiple Employee Injuries

The North Carolina Division of Occupational Safety and Health requires that all fatal accidents or injuries involving three or more employees be reported to NC OSH within **eight hours** of the incident. The following persons are to be informed immediately when an employee is fatally injured, or three or more employees are injured in a single incident:

Division Safety Consultant		
Division Public Affairs Officer	Susan Massengale	(919) 807-6359
Division Director	Chuck Wakild	(919) 807-6357
DENR Safety Director	Steve Kaasa	(919) 715-4500
DENR Communications Director	Diana Kees	(919) 715-4112

The Department Secretary and / or Governor will be notified by the Department Safety Officer.

For incidents occurring after regular working hours, or on weekends and holidays, contact the Capital City Police at (919) 733-4646. They will log the report and forward it to NC OSH on the next workday.

For all incidents, except multi-person injuries or fatalities, occurring after normal working hours, weekends and holidays, the Division and Section contacts are to be notified on the next working day.

For incidents involving 3 or more persons or a fatality, contact the above personnel immediately.

4.3 Accident Information Needed

The following information, at a minimum, is to be obtained at the time of an accident or injury:

1. Name of person(s) involved.
2. Location of incident.
3. Time of incident.
4. What conditions led to the incident.
5. How incident occurred.
6. Contact telephone number.
7. Location of involved employee(s).

5 LABORATORY SECTION SAFETY COMMITTEE

Members of the Laboratory Section Safety Committee are chosen on a volunteer basis only. Each laboratory group/unit will send a non-managerial staff member to the scheduled meetings.

There are no formal qualifications, other than being a Laboratory Section employee, to serve on the Safety Committee.

5.1 Duties of the Members

The duties of the Laboratory Safety Committee members are:

- To assist the Division Safety Consultant in performing the periodic inspections of the Laboratory. A report of the inspections will include any deficient conditions or practices noted, corrective measures needed, and a time schedule for implementation of the corrective measures. The report will be forwarded to the Laboratory Section Chief, the Laboratory Section CHO, and the Division Director or his representative.
- To review the circumstances and causes of accidents and reported near miss incidents, and to recommend corrective measures.
- To observe and report any unsafe practices or conditions.
- To report and discuss safety suggestions made by fellow employees.
- To recommend any needed changes in the Laboratory Section Chemical Hygiene or Safety Plan.
- To set an example for safety at all times.

5.2 Organization of the Safety Committee

The organization of the Laboratory Section Safety Committee is as follows.

1. Meetings will be held on the first **Monday** of every **month** at **10:30 AM** in the employee break room.
2. Meetings will last approximately 30 minutes.
3. Committee members will serve terms of at least **12** months. Continuity of the Committee will be maintained by replacing no more than one third of the members in any given 12-month period.
4. Attendance of members is mandatory.
5. Meeting agendas will be limited to Safety Related issues and problems.
6. The chairperson will serve a term lasting at least 12 months, with all members having equal voice in selecting/electing the new chairperson.

5.3 Safety Checks

In addition to assisting the Division Safety Consultant with the annual laboratory safety audit, the members of the Laboratory Section Safety Committee are also responsible for conducting regular safety checks within their laboratory groups/units. The safety checks should be recorded, and any deficiencies should be discussed at the subsequent safety meeting, or with the Division Safety Consultant. Normal safety check procedures are:

1. Monthly, each of the eyewashes and drench hoses in the group/unit, whether located at a lab sink or at a safety shower, should be checked for proper water flow.
2. Monthly, the safety showers in the group/unit should be operated for several seconds to flush the pipes and to check that water is flowing properly. A nylon sleeve, attached to PVC plastic handle, is used to direct water from the shower into a bucket.
3. Monthly, the fire extinguishers located in the group/unit should be checked. See section 14.4 for more information.
4. Quarterly, the chemical fume hoods located in the group/unit should be evaluated. See section 19.2.3 for more information.

The Safety Committee's chairperson and vice-chairperson will be responsible for conducting safety checks for the eyewashes, safety showers, and fire extinguishers that are located in the hallways and common areas.

5.4 Incident Investigation by the Safety Committee

The purpose of accident / incident investigation is to collect facts, not to place blame. The aim of this investigation is to determine the "root" cause of the accident / incident. Accident / Incident investigation will place emphasis on:

- Was the accident / incident caused by an unsafe act or condition?
- Was the employee doing anything that was unsafe?
- If so, what reason did the employee give for not acting safely?
- What steps need to be implemented to prevent similar occurrences in the future?

6 CHP TRAINING

It is the direct responsibility of the Branch and Unit Supervisors to ensure that safety training is available to employees. It is the employee's responsibility to make maximum use of the training opportunities provided to them.

6.1 New Employee Orientation and Training

On employment with the Laboratory Section, new personnel (permanent, part-time, temporary, interns, etc.) will be oriented to the general safety procedures in the laboratory and will be given the opportunity to read the Chemical Hygiene Plan. Each new employee will be required to sign a statement indicating that orientation information was made available, that they have reviewed the Chemical Hygiene Plan, and understand the information contained in those documents. The employee's Unit supervisor will allow adequate time, **before beginning work**, to read the documents and clarify any areas that are not understood.

New employees of the Laboratory Section will receive a general safety orientation, which will, at a minimum, include:

- Use of chemicals in the Laboratory, the hazards associated with those chemicals, and appropriate chemical waste disposal procedures.
- Accident / Incident prevention and reporting procedures.
- Laboratory fire safety and evacuation plans.
- A tour of the Laboratory facility.

6.2 Unit Specific Chemical Hygiene Training

Employees will be apprised of the hazards present in the workplace upon initial assignment to the Unit or whenever new chemicals or processes are introduced into the work area. Branch or unit supervisors, leads or designated assignee will be responsible for unit specific chemical hygiene training for new or newly transferred employees and will schedule a safety orientation with Division Safety Consultant at a later date. All training is to be documented, with copies of the

documentation being kept in the Laboratory Section training files, and a copy forwarded to the Division Safety Consultant for inclusion in the Division Training files.

At a minimum, employees are to be trained in the following areas:

- The contents of the Chemical Hygiene Plan and how it applies to the Unit.
- The location and general contents of the Unit Material Safety Data Sheet (MSDS) file. This training can be handled in a hazard class basis for normal chemicals; however, specific, particularly hazardous chemicals must be covered in detail to ensure employees are aware of the chemical's hazardous properties.
- The current Permissible Exposure Limits (PEL's) for exposure to chemicals in the Unit.
- The detection of leaks or releases of chemicals in the Unit and specific cleanup procedures to be used.
- The personal protective equipment required to be used in the Unit.

6.3 Additional Laboratory Section Training

Additional training courses will be made available from time to time. These courses may be mandatory or optional, depending on the topic. Employees are required to attend all mandatory training and are encouraged to take any optional training. Optional training may include such training as First Aid or CPR training.

7 CHP MEDICAL SURVEILLANCE

All employees in the Laboratory section may receive a baseline physical within **3-6** months of working in the Laboratory. Employees may also receive a physical periodically during their employment with the Laboratory Section. These examinations are provided at no cost to the employee.

Duke Occupational Medicine performs the baseline physical at their Research Triangle clinic. The examining physicians are occupational medicine physicians. A medical history will be compiled and specific blood tests may be performed. During the baseline and any follow-up exams, it is particularly important that each employee inform the examining physician of the type of work performed in the Laboratory and the types of substances to which exposure may occur. Substances of particular interest are heavy metals, cholinesterase inhibitors (pesticides), and potential carcinogens.

8 VISITORS TO THE LABORATORY SECTION

Persons not in the employ of the Laboratory Section may be considered visitors to this site. Access to the Laboratory Section building is to be regulated as the Section does enforce the FDA and EPA rules regarding chain of custody for some of the samples entering this building. Certain individuals that frequent the premises may, after initial orientation and hazard training, be allowed to forego the visitor sign in process. Determination of exclusion from the normal visitor process will be done on a case by case basis for these persons.

All visitors are to sign the Visitor Logbook. Visitors are to be met in the front office area by the employee who the visitor is requesting to see. Visits into restricted areas of the Laboratory building will be at the discretion of the Unit or Branch Supervisor, or the Laboratory Director.

Prior to entering a restricted area:

1. Visitors will receive a safety review for the specific area before they proceed to that area.
2. Visitors will be issued appropriate personal protective equipment for that area
3. Repairmen, maintenance personnel, or construction employees will be instructed in the hazards associated with areas around their work sites. The Division Safety Consultant or the CHO will review their tasks and issue appropriate instructions and precautions.
4. Visitor injuries require an Incident Investigation report be completed and forwarded to the Branch Supervisor, the Laboratory Safety Committee, the Section Chief and the Division Safety Consultant.

9 CHP REVIEW AND UPDATE

In compliance with the current OSHA regulations concerning the Laboratory Standard, 29 CFR 1910.1450, and any amendments made to those regulations by the North Carolina Department of Labor's Division of Occupational Safety and Health, the Chemical Hygiene Plan will be reviewed and updated on an **ANNUAL** basis. The review process will include coordination with the Laboratory Section Safety Committee and the Chemical Hygiene Officer, the Division Safety Consultant and the Division Director or his representative. If substantial changes are made to the Plan during this process, all Laboratory Section employees will receive updated training in the changes made to the Plan.

10 CHP EMERGENCY RESPONSE

The potential for an emergency to occur at the Reedy Creek Chemistry Laboratory is very real. The Laboratory has on premises potentially hazardous chemicals, compressed gases, potentially carcinogenic materials, flammable and combustible liquids, and other similar types of materials. Types of emergencies that can occur include but are not limited to:

- Fires
- Chemical Spills
- Biologic Contamination
- Security Threats

The general form of response will be to perform either a general or local area evacuation.

10.1 General Evacuation

A general evacuation requires all persons to exit the laboratory building. Routes and exits are marked by exit signs and on the Laboratory Section Evacuation Map (see forms appendix) which should be displayed on each unit's main exits.

The primary assembly area for all Laboratory personnel is the **NORTH SIDE** of the laboratory building in the employee parking area. In case of bad weather, the alternate assembly area will be the **SOUTH SIDE** of the Environmental Sciences Section (ESS) building.

A roll call of employees will be made by the supervisory staff to ensure that all personnel on duty or visiting the premises have evacuated.

Employees should not return to the laboratory building until instructed to do so by supervisors.

In the case of an evacuation due to chemical spill, the MSDS file is to be taken outside during the evacuation (if safe to do so).

10.2 Local Evacuation

A local evacuation does not require exit from the building. Occupants of the Unit are to leave the Unit and assemble in the hallway outside the Unit, at an appropriately safe distance. Do not hinder emergency or cleanup operations.

Take the MSDS file to the safe distance location if safety permits.

10.3 Specific Evacuation Procedures

10.3.1 Fire

Activate the nearest pull alarm. Leave the area and ensure that all other personnel in the affected area have been evacuated. Call **9-911** to activate the fire emergency services. Proceed with the general evacuation plan and assemble at the outside assembly area.

10.3.2 Gas Leaks

In case of a leak of an explosive, flammable, asphyxiating or corrosive gas, proceed with the general evacuation plan.

10.3.3 Chemical Spills

The nature of the chemical spill will determine the level of evacuation and emergency response. Treat all chemical spills with appropriate caution.

Determination of the appropriate cleanup or emergency response measures will be made from the evacuation assembly location.

Types of Spills:

- A small spill is defined as a spill that involves the equivalent of less than 500 milliliters of a chemical substance and the substance is not a highly hazardous substance. For small spills, perform the necessary evacuation to a local evacuation point, and refer to the chemical specific MSDS for appropriate cleanup procedures, personal protective equipment to be utilized, and for any other safety related precautions.
- A large spill is defined as a spill of a substance that involves the equivalent of 500 milliliters or more and the substance is not a highly hazardous substance. A large spill may necessitate the evacuation of the Laboratory building or a substantial portion of the building.
- For spills involving particularly hazardous substances, such as asphyxiating, explosive, highly reactive, etiologic, or flammable chemicals, proceed with the general evacuation procedure.

10.3.4 Chemical Spill Plans

An important part of the Safety Plan is the review of all possible spills ahead of time. The following factors should be considered:

- Potential location of the spill
- Probable quantities of materials that could be spilled
- Chemical and physical properties of the materials
- Hazardous properties of the materials
- Personal protective equipment needed in case of a spill.

The necessary spill control materials should be readily at hand and all personnel should be trained in their use.

10.3.5 Response Steps for Chemical Spills

1. Leave and Control Spill Area

- Alert others in the area and the immediate supervisor as soon as a spill occurs.
- Consult the MSDS for spill control procedures specific to the chemical. **CAUTION:** some materials become corrosive, explosive, irritating and otherwise hazardous on contact with water.
- If safety permits, spill control pillows can be used to contain a spill.

2. Help any injured personnel

- Remove personnel from spill area.
- Remove contaminated clothing, flush eyes and/or skin with copious amounts of water (if chemical is not water reactive), using eyewash and/or emergency showers.
- Seek professional medical attention if substances are splashed in eyes, and/or if burns or respiratory problems are evident.

3. Evaluate the hazard

- If it appears that the spill is too large to be easily contained and cleaned up, call 9-911 and request help, giving the location and nature of the emergency.
- If spilled chemicals are flammable, extinguish all nearby sources of ignition.
- Shut down all equipment with the power switch located at the exit to the hallway and vacate the room until it is decontaminated.
- The following substances are particularly hazardous and cleanup should be handled only by someone with proper training:

aromatic amines
bromine
carbon disulfide
cyanide
ethers
nitro compounds
organic halides
any regulated substance

- If there is no fire hazard and the material is not particularly volatile or toxic, clean it up as soon as possible.

4. Clean up the spill

- Avoid skin and eye contact by wearing appropriate protective clothing (gloves, face mask, etc.); to prevent inhalation, wear appropriate breathing apparatus. If skin contact should occur consult the First Aid section of this Safety Plan.
- Any contaminated clothing must be removed immediately to prevent chemical penetration to the skin. Wash thoroughly with soap and water. Brush off any solid residues BEFORE washing skin. Flush skin with water for at least 15 minutes. Clothes must be laundered before reuse (DO NOT WASH WITH OTHER CLOTHING).

- To facilitate cleaning up liquids, use an adsorbent material that will neutralize the liquids if possible (trisodium phosphate; sand followed by sodium bicarbonate solution or powder for acids; sodium thiosulfate solution for bromine, etc.) Commercial adsorbents (e.g., Oil-Dry and Zorb-All), vermiculite, or other satisfactory clay adsorbents (about 30 mesh) are also recommended. Dry sand may be used when other more effective materials are not available.
- All waste from cleanup should be disposed of in accordance with hazardous waste procedures. Do not leave paper towels or other materials used to clean up a spill in open trashcans in the work area. Dispose of them according to the MSDS sheets. **DO NOT THROW WASTE IN A TRASHCAN.**
- Many small liquid spills can be adsorbed with paper towels, sand or an adsorbent. However, paper towels can increase the surface area and evaporation rate of flammable liquids increasing the fire hazard.
- For larger spills, spill control pillows are available in each unit. Note that when used to absorb acids, spill control pillows must be neutralized prior to disposal.
- Most solid spills can be brushed up and disposed of in appropriate solid-waste containers, but care must be taken to avoid reactive combinations.

10.3.6 Spills Involving Specific Types of Chemicals

Acids

(Concentrated and dilute solutions of Acetic, Formic, Nitric, Phosphoric, Perchloric, Sulfuric, and Hydrochloric acids)

1. For small spills of 500 ml or less, the acid should be neutralized using a liquid neutralizer (available in room G031) then absorbed with either paper towels or an absorbent. Acid-neutralizing absorbent pads can also be used (available in room G031).
2. For large spills of 500 ml or more, use spill control pillow to soak up as much acid as possible. Follow the instructions on the pillow dispenser box. **CAUTION:** Most pillows cannot be used with hydrofluoric acid (HF).
3. Used pillows should be neutralized with a liquid neutralizer or lime prior to disposal.
4. Place the used pillow in a plastic bag for later disposal. Neutralize the remaining acid with a liquid neutralizer or an acid spill cleanup kit, following the instructions on the kit.

Acid chlorides

1. Acid chlorides are potent lachrymators (chemicals that cause watering of the eyes).
2. For acid chloride spills, use calcimined adsorbent products, such as Oil-Dri or Zorb-All, or dry sand.
3. Avoid contact with skin.
4. Avoid inhaling hydrogen chloride vapors. If vapors are prevalent, evacuate the area (see section 10.2).

Caustics

(Solutions of ammonium, calcium, potassium, or sodium hydroxide)

1. For large spills, use spill control pillows, following dispenser box instructions.
2. Place used pillow in a plastic bag for later disposal. Neutralize remaining spill with caustic spill cleanup kit following instructions on the kit.

3. Small spills may be treated directly with spill cleanup kit.

Organic Solvents

(e.g., methylene chloride, ether, acetone, hexane)

1. Make sure that any flame sources are extinguished or turned off. Local evacuation may be necessary to prevent exposure to solvent fumes.
2. Cover the spill with solvent-sorbent powder. The spill can also be contained using absorbent pillows and socks.
3. For nearby fume hoods, open the sash doors to the mid-point; this will assist in removing solvent fumes and vapors from the room.
4. For cleanup, personnel should wear all PPE and a filtration mask (if available). Absorbent powder and pillows containing the spilled solvent should be placed in a plastic bag. The bag may first be placed under a fume hood to further allow solvent fumes to be contained, but should be moved to the solvent storage room. The waste should be held for removal by a hazardous waste vendor.

Mercury

1. Because of the high toxicity of mercury vapor, spilled mercury should be immediately and thoroughly cleaned up by using an aspirator and a vacuum source. An aspirator can be made and used as follows:
 - Obtain side arm flask, appropriate lengths of flexible tubing, glass tubing and stopper for flask, and a pipette. The side arm is connected to the vacuum source
 - Place water in flask, stopper flask with glass tubing extending through stopper to below water level.
 - Connect flexible tubing to glass tubing and to pipette.
 - Collect free mercury, then place all used equipment in appropriate plastic bag for disposal.
2. Mercury spilled into floor cracks can be made nonvolatile by amalgamation with zinc dust or sulfur powder.
3. Domestic vacuum cleaners **MUST NOT** be used because they will only redisperse mercury aerosols and spread the contamination.
4. A mercury vapor monitoring instrument should be available for determining the effectiveness of the cleanup.

10.4 Medical Emergencies

A medical emergency is defined as a situation where a person is injured to an extent greater than first aid measures can accommodate and the affected person needs professional medical attention. Types of medical emergencies may include deep cuts or punctures, thermal or chemical burns, eye injuries, and similar conditions. If a medical emergency is serious or life-threatening, contact EMS via telephone by dialing **9-911**, and request an ambulance or other emergency service to respond. Be sure to provide the physical address of the laboratory building, which is **4405 Reedy Creek Road**. Stay on the telephone until instructed otherwise by the EMS operator. If a medical emergency is determined to not be serious or life-threatening, and the injured employee can be

transported **SAFELY** and without any further injury or aggravation, state automobiles may be utilized to transport the employee to a local hospital or emergency care center (see section 4.1).

10.5 Other Threats

Other threats may necessitate a general evacuation. These evacuations may be called by management, other safety personnel, or local emergency or law enforcement personnel. Follow the instructions given by the management team, or other person(s) in charge.

City Water Outage: In case of a city water outage, the laboratory fire/sprinkler system is functional but eye washes and safety showers will not work. Any procedures that may pose a safety hazard requiring possible use of eye wash or safety shower should cease or not be performed.

10.6 Drills

General evacuation drills (fire drills) will be scheduled by the Laboratory Chemical Hygiene Officer or Section Chief. The fire alarm should be activated by personnel from Facilities Management or the division's Fire Safety Office. Drills must be conducted on an annual basis (at a minimum). Record information for each drill (date, time to evacuate building, etc.) using the form in the Forms Attachments section. The completed form should be maintained at the laboratory, and a copy forwarded to the Division Safety Consultant.

11 PERSONAL PROTECTIVE EQUIPMENT

The Division provides certain personal protective equipment to employees at no cost. This equipment is made available for personal protection. Do not misuse or abuse the equipment. Misused and abused equipment will be replaced at the employee's expense.

The Laboratory Section maintains a washer and dryer for laundering of certain articles. These articles, which include lab coats, are to be washed on site and not taken home for laundering.

11.1 Hazard Assessment

The Division Safety Consultant, in conjunction with the CHO, the Unit Supervisors, and employees of the Unit will perform job hazard assessments as needed on the basis of a significant change in procedure or equipment. The reason for the job hazard assessment is to indicate all personal protective equipment that will be needed to perform the particular job safely. Training will be given in the appropriate fitting, use, care, and storage of any personal protective equipment that is issued.

11.2 Eye Protection

Division policies require the use of eye protection when there is a reasonable probability of eye injury. Appropriate protective devices shall be worn by employees and visitors in all areas identified as Eye Hazard areas. There are no exceptions to this policy.

Contact lenses can trap and retain chemicals and vapors from the air and caution should be used when wearing contact lenses in areas where laboratory chemicals are used or stored.

11.2.1 Types of Eye Protection

Various types of eye protective gear may be used in the Laboratory Section. The specific type will be determined during the Job Hazard Assessment. Various types and sizes of eye protection will be available for use by employees and visitors. This may range from simple impact resistant eye wear to splash resistant goggles.

Employees that normally wear prescription eye wear and are required to wear safety eye wear while performing their jobs will be able to obtain safety eye wear through specified suppliers. Any cost of the eyewear above the authorized cost will be borne by the employee.

11.2.2 Eye Wash Equipment

Safety eye wash equipment is located throughout the Laboratory Section groups and units. It is the responsibility of the employee to ensure they know the location of the closest eye wash station. If eye washing is necessary, washing is to be performed for a minimum of **15 MINUTES**.

Eye wash stations are to be tested by the group/unit safety committee representative on a monthly basis to ensure that this equipment is operating properly. Appropriate documentation of the testing will be maintained by the Unit Safety Committee Representative and archived by the CHO.

11.3 Face Protection

A full face visor may be worn when:

- Using concentrated acids or bases
- Using flammable solvents
- Heating glassware
- Using equipment when contents are under pressure

11.4 Hand and Foot Protection

Gloves, of the appropriate type, are to be worn when handling:

- Chemicals (At minimum, the Nitrile disposable type are to be used.)
- heat sources
- extremely cold (subzero F) substances
- soapy glassware that is being washed

Disposable nitrile gloves are the standard hand protection in the laboratory and should be worn when handling chemicals or samples. Note: Disposable Nitrile gloves may only provide short-term protection from some solvents and concentrated chemicals.

Disposable Nitrile gloves may not be suitable for hand-washing large laboratory glassware (e.g., separatory funnels) since they are thin (not puncture-resistant) and short in length. Nitrile gloves also can become slick when wet, so caution should be used when handling wet glassware.

Latex or latex type gloves that cover the forearm and have grip finger tips should be used when washing such large laboratory glassware to help guard against slippage causing broken glass and possible injury.

Any dermatitis or allergies are to be reported on the Incident Investigation Report, and must be evaluated by the Division Safety Consultant.

Thermal gloves are to be worn when handling extremely cold or hot objects or substances.

Appropriate chemical protective gloves are to be worn when handling chemicals. Certain types of glove materials will protect against specific types of chemicals. Make sure the glove material selected provides the maximum amount of protection.

Hands are to be washed thoroughly and immediately if contaminated with chemicals.

Proper clothing and foot covering are vital to individual protection. Shorts, sandals and open-toed/ heeled shoes are not to be worn in areas where chemicals are handled and/or samples are processed and analyzed.

11.5 Torso Protection

Lab coats are to be worn whenever employees are actively running tests, setups, or handling chemicals. The lab coats are to be buttoned to protect the wearer's street clothes. The laundry facility is to be used to clean the lab coats. Do not take these coats home to launder.

Chemical resistant aprons are to be worn when handling caustics, acids greater than 6N or bases less than 2N.

11.6 Respiratory Protection

The environment of the Laboratory Section is monitored on an as needed basis to minimize exposure to airborne contaminants. If the environmental monitoring indicates that OSHA permissible exposure limits are in danger of being exceeded, then additional engineering or administrative controls will be instituted. In the event that engineering or administrative controls are not adequate to control an airborne contaminant, specific respiratory protective procedures will be implemented on a case by case basis. For information concerning the use of respiratory protective equipment, refer to the Division of Water Quality's Respiratory Protection program.

12 FIRST AID

12.1 General

While on the job, any injury that occurs is to be reported to the employee's immediate supervisor. In the Laboratory Section, no personnel are designated as first aid responders; however, for minor cuts, scrapes and burns, first-aid kits are available at each end of the laboratory's main hallway and in the Chemical Hygiene Officer's office. More severe injuries will require attention from a medical provider. If medical attention is sought, the incident is to be formally reported, in writing, to the employee's supervisor and to the Division Safety Consultant. See Section 4, Accident and Incident Reporting, for further information.

12.2 Chemical Exposure and First Aid

If an employee is exposed to a chemical, speed is essential. For eye contact (see section 11.2.2) and for skin contact, immediately flush the area with water for a minimum of 15 minutes. For serious chemical exposures, employees are to be transported to the closest medical facility via county emergency medical services. A copy of the MSDS is to be taken with the employee so the medical provider will know the type(s) of chemical(s) involved. Additionally, the Emergency Notification Information sheet kept in the front office and supervisor's office is to be taken with the employee to the medical provider.

12.2.1 Chemical Contact to Body

1. Quickly remove all contaminated clothing while using a safety shower. Waste no time, seconds count. However, be careful not to spread the chemical on the skin or into the eyes.
2. Immediately flood the affected body area with cold water for at least 15 minutes. Resume if pain returns. A safety shower that is equipped with hot water is located in the men's restroom and can be used after initial rinsing of the chemical(s) from the body.
3. Wash off chemicals with a mild detergent and water, but do not use neutralizing chemicals, unguents, creams, lotions, or salves.
4. Get medical attention as soon as possible. Provide medical personnel with the exact chemical name so that proper treatment may be started as soon as possible.

12.3 Equipment on Site

The Laboratory Section has three first aid kits on site. These kits are located in the main east - west corridor, near the water fountains, and in the Chemical Hygiene Officer's office. These kits are to be used for minor injuries only. The main corridor kit contents will be checked and re-supplied on a monthly basis. The modular building for the Certification group has one first aid kit and will be checked and resupplied on a monthly basis.

12.3.1 Automated External Defibrillator

The Laboratory Section has an Automated External Defibrillator (AED) that is mounted on the right side wall of the Section Chief's office door. The AED is used to administer an electric shock to a fibrillating heart of a victim in order to bring the heart back to its sinus rhythm. When the AED is removed from its case and the face plate is opened, an automated voice instruction begins giving step-by-step directions for use on a victim. One of the steps will indicate that the chest is to be fully exposed by removing all clothing in that area so that the contact pads can be properly placed and secured on the skin. The device will then determine if shock is needed. Light emitting diodes (LEDs) indicate status of the AED and batteries which are functional for about five years. A training DVD is available with the device at the mounting station and should be returned after viewing. The status indicator light is to be checked on a monthly basis.

12.4 First Aid Training

All employees throughout the Division will have the opportunity to attend First Aid, CPR and AED training. The training is optional and personnel taking the training will not be identified as Division first aid responders. The training will be scheduled through and provided by the Division Safety Consultant. Employees obtaining this training will be certified in First Aid and CPR practices through the National Safety Council in conjunction with the Safety and Health Council of North Carolina.

13 WORK AREA HOUSEKEEPING

Work and office areas are to be maintained in a clean and orderly manner, chemicals and equipment are to be properly stored and labeled. In addition, the following housekeeping rules apply to all working areas of the Laboratory Section:

1. For Personnel and Fire Safety reasons, cell phone use (including Bluetooth and other “handless” technology) is **NOT** permitted while performing laboratory procedures, especially when working with hazardous chemicals (e.g., flammable liquids and corrosives).
2. Food and consumption of food items is **ONLY** permitted in defined areas. Consumption of food and beverage items is **NOT** to be permitted where laboratory operations are being performed.
3. Glassware and utensils for laboratory operations are not to be used for food preparation or consumption. Laboratory coolers and chemical storage freezers or refrigerators are not to be used for food storage.
4. Glassware is to be rinsed immediately following use to prevent others from coming in contact with residues left in or on the items.
5. Work areas are to be cleaned promptly after use and to be kept free from obstruction.
6. Equipment and chemicals are to be stored and labeled properly.
7. Unlabeled containers and chemical residues are to be disposed of properly and in accordance with appropriate procedures. Materials and chemicals no longer needed are not to be allowed to accumulate in the laboratory.
8. Floors are to be cleaned regularly. Spills should be cleaned up immediately. Keep floors free of slip, trip or fall hazards.
9. Stairways and hallways are not to be used as storage areas.
10. Access to exits, emergency equipment, and building control devices are not to be blocked. A 44 inch pathway of egress should be maintained through all areas of travel in the laboratory.
11. Cords and plugs hanging or protruding from the ventilation hoods should be secured. Extension cords should be considered as temporary only. Only one power strip should be used per plug outlet.

14 LABORATORY FIRE SAFETY

14.1 Fire System Controls

The Laboratory Section building at Reedy Creek Road is equipped with a fully automatic, supervised sprinkler system. In the event of fire that begins to engulf a room of the building, the system will activate to control the spread of fire until the local Fire Department arrives. This system is inspected quarterly and is maintained in operable condition by the Facility Engineers. The control valves for the system are located in the storage area adjacent to the loading dock. Clear access to these controls must be maintained at all times. Do not block access to these controls.

Fire extinguishers are placed throughout the Laboratory Section building. The locations of all extinguishers are shown on the Emergency Equipment Locator that is posted in all laboratory rooms. All personnel are expected to know the location of the fire extinguishers. Fire extinguishers are only to be used in initial stage fire control.

In addition to the automatic sprinkler system and fire extinguishers, the building is equipped with a fire control system. In case of fire, the building fire control system will activate the audible alarms. When the audible alarms are heard, employees should leave the building using the most convenient exit and gather with respective units in the grassy area between the back parking lot

and Reedy Creek Road. Supervisors will take roll call to ensure all personnel are out of the building. Management will inform all employees when the building is safe to reenter.

14.2 Types of Extinguishers

Fire extinguishers are provided in each of the laboratory rooms and in the hallway. The Laboratory Section extinguishers are to be used for initial stage fire fighting only and are Class ABC extinguishers:

Class A: used on fires of paper, wood, cloth and plastic materials.

Class B: used on fires of flammable / combustible liquids, flammable gases, greases, and some plastics and rubber products.

Class C: used on fires involving live electrical equipment.

14.3 Other Fire Safety Equipment

- Fire Blankets are located throughout the Laboratory area. Refer to the Emergency Equipment Locator for the location of these blankets.
- Drench Hoses / Showers are located in the hallways and lab rooms.
- Fire alarm pulls are located at each of the major building exits.

14.4 Fire Control System Inspection and Training

1. The automatic sprinkler system is inspected and tested on a quarterly basis by the Facilities Management work crews. Any repairs or problems associated with the sprinkler system are to be reported to Facilities Management.
2. Each fire extinguisher in the laboratory building is to be visually checked on a monthly basis. Each extinguisher should be checked for the following:
 - The safety pin should be secure in the handle of the fire extinguisher. The safety pin prevents a fire extinguisher from being accidentally activated.
 - The needle of the pressure gauge should be in the green area, which indicates that the extinguisher is at the proper pressure. If the needle is outside of the green area, notify the Safety Committee chairperson or the Chemical Hygiene Officer. An extinguisher that is not at the proper pressure should be replaced as soon as possible.
 - Check the extinguisher's hose and nozzle. The hose should not have any cracks or signs of wear, and the nozzle should be free of debris or any obstructions.
 - The fire extinguisher should be easily accessible. If anything is blocking the extinguisher (e.g., boxes or lab carts), the item(s) should be moved.
3. If all of the above items are acceptable, the inspection attached to the extinguisher should be initialed to indicate that the extinguisher has been checked.
4. Each fire extinguisher should also be inverted each month to assist in keeping the powder free flowing. If the powder does not seem to be free-flowing, see the Safety Chairperson or Chemical Hygiene Officer.
5. Fire extinguishers located in the lab units should be checked by the unit safety representative. Fire extinguishers in the hallways and other areas should be checked by the safety committee chairperson and vice chairperson.

6. An annual maintenance check of all extinguishers is to be performed and documented by General Services. Hydrostatic testing of the extinguishers is to be performed for all extinguishers in the Laboratory Section every twelve years.
7. All personnel will be instructed in the basic fire hazards associated with normal Laboratory Section operations during their initial assignment training and on an annual basis thereafter.

14.5 Fire Prevention Procedures

Each employee needs to have an understanding of the potential fire hazards with a particular procedure or for daily activities of a non-analytical nature. This involves an understanding of reagents and equipment, their nature and function. Fire prevention information is contained in the material safety data sheets for the chemical reagents and the operator's manuals for instrumentation and equipment.

Assume that a fire will take place. Be aware of the high probability of fire and plan accordingly. Laboratory fires are generally localized and small; however, there is a potential for a fire to get out of control. The potential for damage and loss of life must be stressed in order to insure the effectiveness of fire prevention guidelines.

The following represent the minimum operating procedures for fire prevention.

1. Smoking is prohibited inside the laboratory building and inside the gas cylinder cage.
2. Notify the immediate supervisor or safety personnel immediately of potentially dangerous situations.
3. Do not use an open flame to heat a flammable liquid or to carry out a distillation under reduced pressure.
4. Use an open flame only when necessary. Before lighting a flame, remove flammable materials from the immediate area.
5. Use exhaust hoods during transfer or analysis of flammable solvent(s) to prevent the formation of flammable mixtures.
6. Store flammable materials properly.
 - Containers must be properly labeled.
 - Flammable liquids are to be stored in NFPA-approved storage cabinets. Cabinets should be ventilated if possible.
 - Eliminate possible contact of flammable liquids or gases with strong oxidizing agents, such as chromic acid, permanganates, chlorates, perchlorates, and peroxides.
 - Exclude ignition sources from flammable storage areas.
7. When dispensing and handling flammable substances, ensure that the area is free of potential ignition sources (including cell phones).
8. Use grounding straps with the 55-gallon solvent waste drums (located in the solvent room) to eliminate sparks created by static electricity.
9. Place waste material that is impregnated with flammable materials in an appropriate waste storage container.
10. Smoke detectors are located over every laboratory door. Group/unit safety representatives need to check batteries semi-annually by pressing the button which activates the alarm if batteries are still good.

15 COMPRESSED GASES

The Laboratory Section uses a variety of compressed gases in the normal course of operations. Compressed gases used are Air, Oxygen, Nitrogen, Hydrogen, Helium, Zero Air, and Argon. Compressed gas cylinders that are not in use, with the exception of Argon, are stored in the compressed gas pen. This outside storage area is located adjacent to the loading dock area of the building.

Compressed gas cylinders are to be treated with respect. Although the cylinders may not be very large, the cylinders do hold a large volume of gas. If gas is allowed to escape into the working environment, the gas will displace the breathing air. Depending on the size of the individual work area, the displacement may be enough to lower the oxygen content of the work environment to the point of asphyxia or to create an explosive atmosphere. Therefore, the rules below are to be followed when handling compressed gas cylinders.

The bulk liquid argon tank is monitored at a remote facility using a dedicated telephone line. If an emergency situation or a potential emergency situation is suspected, call 1-800-535-5053 (Machine Welding and Supply Company) and report the problem to the Lead Chemist of the Metals unit.

15.1 Moving Compressed Gas Cylinders

1. A cylinder truck is to be used when moving cylinders larger than forty pounds. Use the chain provided on the truck to secure the cylinder.
2. When exchanging cylinders, one person can perform the task. Two or more people can be used if one is uncomfortable with the load.
3. Handle cylinders of compressed gases as high-energy sources and therefore as potential explosives.
4. Do not move a cylinder with the regulating or pressure reducing valves in place. The protective cap must be secured in place before a cylinder is moved.

15.2 Storing Cylinders in the Work Area

1. Cylinders are to be stored in the upright position and secured to a substantial mounting bracket to prevent tip over of the cylinder.
2. Do not expose cylinders to temperatures higher than about 50°C. Some rupture devices on cylinders will release at about 65°C.
3. Do not place cylinders where they may come in contact with an electrical unit. Avoid areas that are damp or subject to corrosive materials.
4. Do not use a cylinder that cannot be identified positively.
5. Do not lubricate, modify, force, or tamper with a cylinder valve.
6. Use suitable supports to hold cylinders at all times.
7. Under no condition should high-pressure gases be directed at a person.
8. A compressed gas, including compressed air, is not to be used to blow away dust or dirt.
9. Rapid release of a compressed gas will cause an unsecured gas hose to whip dangerously which may also build up a static charge that could ignite a combustible gas.

10. Do not extinguish a flame involving a highly combustible gas until the source of the gas has been shut off.
11. When not in use, close cylinder and bench valves. The main cylinder valve is to be tightly closed but any needle valves on the regulator or lines need only be finger tight to avoid ruining the valve and/or valve stem.
12. Never bleed a cylinder completely empty. Leave approximately 300 psi in the cylinder to ensure the interior of the cylinder is not contaminated.
13. When the cylinder is empty, remove the regulator and mark the cylinder as "EMPTY". Separate empty and full cylinders.
14. Fuel gases are to be stored separately from non-fuel gases.
15. Use the appropriate regulator on each gas cylinder. Specific compressed gases require specific regulators
16. Oil or grease on the high-pressure side of an oxidizing gas (oxygen, chlorine, etc) can lead to an explosion.
17. Use a trap or check valve to prevent back siphoning of chemicals into a cylinder.
18. Wear safety glasses and gloves when handling compressed gas cylinders.
19. Before loosening a regulator, check to see if the gas is flammable and if the fitting is reverse threaded. A notch on the nut of the regulator indicates reverse threading. Failure to recognize a reverse threading may result in over-tightening the nut.
20. When attaching a regulator to a gas cylinder, do not over-tighten the nut. Over-tightening the nut may result in the need to use excessive force when the gas cylinder needs to be changed.

15.3 Storing Cylinders in the Cylinder Pen

The compressed gas cylinder pen is located on the West end of the building, and is adjacent to the loading dock area. This is the main storage area for the compressed gases used in the building.

1. Fuel gas cylinders are to be stored no less than 20 feet from cylinders containing oxidizers.
2. Empty cylinders are to be marked as "EMPTY", and segregated from "FULL" cylinders.
3. All cylinders are to be stored with the protective cap in place, and secured against tip over. Chains at each cylinder grouping are provided for this purpose.

16 ELECTRICAL & MECHANICAL HAZARDS

16.1 Electrical Hazards

1. DO NOT TOUCH a person in contact with a live electrical circuit. DISCONNECT THE POWER FIRST or further serious injury may occur.
2. All laboratory personnel should know the location of the emergency circuit breakers and how to cut off all electrical service to the laboratory in case of fire or accident. Each Laboratory room is equipped with an emergency electrical breaker which will disconnect **ALL** electricity to the room. This wall switch is used only for emergency situations in order to extend reliability.

3. Plug equipment into outlets designed to carry the ampere rating of the equipment. All electrical outlets are to be grounded. Electrical outlets within six linear feet of a water source should have ground fault circuit protection.
4. Eliminate wiring that is frayed or worn, or that is stretched across the floor where someone could trip over it.
5. Beware of the explosion hazard of hot plates and flammable liquids under the hoods. Maintain a clear area around cooling fans and vents.
6. No flammable gases should be stored near high voltage (or hot) equipment. Exceptions include hydrogen tanks near gas chromatography and acetylene near Inductively Coupled Plasma and Atomic Absorption Spectrometer instruments. Label all high voltage equipment.
7. Keep electrical cords free and not kinked. Turn off unnecessary electrical devices during weekends and holidays.
8. Computers are to be connected to surge protection devices.
9. Avoid overloading sockets with multiple plugs for related equipment.
10. Combustible items are to be kept clear of heat sources.
11. Refrigerators constitute a unique hazard because explosions may occur when they are used for storage of volatile or unstable chemicals. Domestic (house-hold type) refrigerators shall not be used for chemical storage unless they are modified by eliminating open electrical contacts and by having the door closures replaced with magnetic door closures.

16.2 Mechanical Hazards

1. Only trained and designated personnel are to perform maintenance activities on laboratory equipment or testing devices. Building related equipment maintenance, such as heating, ventilating, air conditioning, plumbing, electrical, is performed by Facilities Maintenance.
2. Guards, guarding devices, or interlocks are not to be defeated or removed from equipment.
3. When performing maintenance on guarded or interlocked equipment, proper lock out procedure is to be used. All power sources (electrical, mechanical, and pneumatic) are to be disabled by any acceptable method of source power control. The person performing the maintenance should maintain control of the lockout devices. Labeling indicating the name of the person and the location of the maintenance is to be affixed to the most visible area of the source power.
4. Personnel performing maintenance procedures on equipment are to wear appropriate personal protective equipment.
5. Compressed air is not to be used for cleaning purposes unless the air pressure has been reduced to less than 30 psi.

17 VACUUM

The term, "vacuum", refers to the condition of an enclosed space that is devoid of air, gases, or other material content. In the Chemistry Section Laboratories, vacuum that is used is more appropriately called a "partial vacuum" because the entire area under reduced pressure is not totally devoid of gas particles. Vacuum used in the Laboratory Section is generally in the range of five (5) to ten (10) inches of mercury (vacuum).

17.1 Safety Considerations

A vacuum apparatus probably presents fewer accidental hazards than almost any other kind of lab apparatus. However, these hazards are by no means entirely negligible. The vacuum hazards most likely to occur in the laboratory are:

1. **Implosion**

This type of hazard is most important with glass apparatus, and is ever-present when large glass bulbs (over one liter in size) or flat bottom vessels (of any size) are evacuated. The force of atmospheric pressure makes dangerous missiles of glass fragments from imploding vessels. Only use vessels that have been designed for vacuum. Reduce the possibility of flying glass by placing strips of plastic electrician's tape on all large glass evacuation vessels.

2. **Explosion**

When a vacuum system liquefies significant quantities of a gas, or condensate is taken up by an absorbent at a low temperature, an explosion can result when the system warms up if adequate vents or safety valves have not been provided. An explosion of a different kind can take place if an oil diffusion pump (particularly a glass one) is vented to air while hot.

17.2 Vacuum Desiccators

The operational manual is to be followed while using any of the Division's vacuum desiccators. Each operator is to make sure he or she is knowledgeable of all controls and safety devices before operating a vacuum desiccator. Additional precautions are listed below:

1. Only chemicals being dehydrated should be placed in a desiccator.
2. When opening a desiccator that is under vacuum, make sure that the atmospheric pressure has been restored. Refer to the manufacturer's instruction manual for the correct procedure to use when a lid is "frozen".

17.3 Water Aspirators

Aspirators for reduced pressure are used mainly for filtration purposes. Only equipment that is approved for this purpose should be used. These recommendations also apply to rotary evaporation operations where water aspirators are being used for vacuum.

1. Never apply a vacuum to a flat-bottomed flask unless it is very small or it is a heavy-walled filter flask designed for filtration.
2. Place a trap and a check valve between the aspirator and the apparatus so that water cannot be sucked back into the system if the water pressure should fail unexpectedly.

17.4 Vacuum Drying Ovens

Laboratory personnel are to follow the operator's manual while using vacuum ovens. Each operator is to make sure he or she is knowledgeable of the operating controls and safety devices before operating a vacuum oven. Additional precautions are listed below:

1. Always keep doors closed and locked whether in use or not.
2. Turn off vacuum ovens when not in use.
3. Temperatures should be allowed to equilibrate for two hours before use and monitored periodically during use.
4. Do not put volatile chemicals in the oven chamber as this may cause fire or explosion.

18 AUTOCLAVES

The Laboratory Section has three autoclaves for use by certain units. Laboratory personnel are to follow the manufacturer's operating manual while using autoclaves. Each operator is to make sure he or she is knowledgeable of all operating controls and safety devices before operating an autoclave. Additional precautions are listed below:

1. Use proper sterilizer loading procedures when placing materials in sterilizer chamber. All solid containers or instruments must be placed so that water or air will not be trapped in them.
2. Determine correct sterilization time by referring to minimum sterilization time chart. Sterilization will not be accomplished in less than fifteen minutes exposure time.
3. When the chamber pressure reading for an autoclave is zero, and the temperature ≤ 50 degrees Celsius, the door for the autoclave may be opened. Be aware that hot steam may escape the chamber as the door is opened.
4. The lever action of the safety valve must be free to operate unrestricted at all times.
5. Allow sterilizer to cool to room temperature before performing any cleaning or maintenance procedures.
6. Always wear protective gloves and lab coat (also safety glasses if processing liquids) when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.
7. When sterilizing liquids, to prevent personal injury or property damage resulting from bursting bottles and hot fluid, use LIQUIDS cycle only and use only vented closures (do not use rubber stoppers). When using bottles with screw-on caps, always make sure that the caps have been loosened from the bottle prior to placing the bottles in an autoclave. Do not use ordinary glass bottles or any container not designed for sterilization.
8. Avoid sudden full opening of door at end of cycle. Open sterilizer door no more than one inch and wait at least ten minutes before unloading sterilizer. Do not allow hot bottles to be jolted. This can cause hot bottle explosions! Do not move bottles if any boiling or bubbling is present. Allow bottles to cool to touch before attempting to move them from sterilizer shelf to storage area. Avoid steam by standing to the side when opening the door to the autoclave.
9. A steam supply malfunction may cause the sterilizer chamber to fill with scalding water. Do not open chamber door if the unit fails to complete an automatic cycle or if water leaks past the door gasket upon unlocking the door.
10. Sterilizing chamber must be cleaned and drained after each use and left open to dry over weekends.

19 LABORATORY VENTILATION

19.1 General Building Ventilation

The ventilation system in the Laboratory Section building consists of a single pass through airflow pattern augmented by chemical fume hoods and capture hoods in the various laboratory units. Each part of the system is crucial for control of air borne contaminants that may be present in the Laboratory building. The single pass through system is designed such that the air entering the building is not recirculated through the building, but instead is exhausted. Because of this pass through characteristic, the air changes in the building approximately 12 times per hour.

Additionally, the system is designed to have air flow from the least hazardous to most hazardous areas of the building which prevents contamination of low hazard areas with contaminants from the higher hazard areas.

19.2 Chemical Fume Hoods

19.2.1 General

Chemical fume hoods are the primary containment devices in the laboratory to control airborne contaminants generated during experimental procedures. Chemical fume hoods provide protection to personnel by means of directional airflow. Air flows from the laboratory area into the hood through the face opening. Employees are to use a chemical fume hood when:

- Procedures involve the use of volatile chemicals, as well as chemicals exhibiting strong odors.
- Chemical process results in generation of toxic vapors or aerosols.
- There is a need for additional physical protection against splash, spray, fire, or explosion.
- Procedures involve the use of a particularly hazardous substance.

19.2.2 Chemical Fume Hood Use

1. Always have an emergency plan that describes proper procedures to follow in event of hood failure. In case of emergency, cease operation, pull sash down and close sash doors. Evacuate the immediate area, if needed.
2. Instruction in proper hood practices will be given to all lab workers during the initial job assignment orientation.
3. Maintenance of the laboratory fume hoods is provided by Facilities Maintenance, a fume hood vendor, or a certified repair service. Employees are not authorized to perform maintenance on the operational controls of any chemical fume hood.
4. Fume hoods are not to be used for permanent storage of chemicals.
5. Work inside a hood should be conducted approximately 6 inches from the front of fume hood. During use, the sash door should be positioned at the certified position mark (if possible). If the sash door is above the certified mark, full fume containment is not guaranteed.
6. Hood work areas are to be clear of unnecessary equipment and materials that can disrupt airflow and block vents/baffles.
7. Lab procedures are to be planned so that, as much as possible, the materials needed for a procedure are present in the hood to eliminate disruption of airflow caused by carrying equipment in and out of the hood during a procedure.
8. While a procedure is in progress, lab doors adjacent to the fume hood in use are to be kept closed, with normal room traffic rerouted to another room entrance door. While lab equipment (block digester, distillation system, etc.) in a hood is operating, the sash door should be positioned with the sash bottom at or above 6 inches from the hood base (below 6 inches, air flow decreases as Phoenix valve gears down), and at or below the certified position mark.
9. Use equipment with legs (so as to not disrupt air flow in the fume hood).
10. Apparatus in the hoods should be fitted with condensers, traps, or scrubbers to contain or collect solvent or toxic vapors.
11. When a procedure in a hood is completed, the hood is to be cleaned with an appropriate cleaner, and the hood sash is to be closed (hood sash windows should also be closed).

19.2.3 Hood Evaluation

1. Chemical fume hoods are to be evaluated for adequate airflow by safety committee representatives on a quarterly basis. A velometer is used to measure the airflow. A written record of the evaluation results will be maintained for a minimum of 3 years. The most current evaluation records should be stored in the laboratory such that they are readily accessible to lab personnel. The evaluation process will include:
 - air flow measurement
 - mapping of the airflow at various places on the periphery of the hood opening
 - designation of a maximum opening size to achieve the necessary airflow
 - general condition inspection
2. The fume hoods at the DWQ Laboratory Section will be adjusted to draw between 80-120 linear feet per minute airflow at the certified sash door height (for full containment).
3. Fume hoods in the lab should be periodically tested and certified by a certified vendor or contractor. To determine the sash door height at which full fume containment is achieved, ASHRAE procedures must be followed, including air flow measurements, visible smoke testing, and traceable gas (with mannequin) testing. The certified sash door height should be clearly marked, and ASHRAE test information should be posted on the fume hood.

20 BIOLOGICAL MATERIALS HAZARDS

Personnel employed with the Laboratory Section may from time to time be exposed to biological material hazards. These hazards include bacteriological contamination of water samples, wildlife tissue samples, bacterial cultures, and contaminants in industrial wastewater samples. Proper handling of potentially contaminated samples can be achieved as follows:

1. Use appropriate personal protective equipment to protect against splash, spray, spill, or physical contact.
2. Equipment and containers used to contain or used in test procedures involving biological material hazards are to be autoclaved prior to washing, or reuse.
3. Petri dishes used for plating out colony cultures are to be placed in an autoclavable biohazard bag and sterilized prior to disposal.
4. Storage of biological contaminants and the areas for biological contamination storage are to be clearly marked and labeled as having potential biological contamination.
5. Spills containing biological contaminants are to be cleaned up immediately, with contaminants placed in an appropriate biological material hazard bag. An appropriate sterilant is to be used on surfaces contacted by spilled material.
6. Work surfaces where biological materials have been handled are to be cleaned at the end of each work shift using an appropriate sterilant (e.g. 70% isopropanol).
7. Frequently wash hands with warm water and soap. Never pipette bacterial samples by mouth – use pipette bulbs.

21 RADIOACTIVE MATERIALS HAZARDS

The Pesticide Analytical Group of the Laboratory Section, in room G047, has gas chromatographs equipped with Electron Capture Detectors (ECDs) that contain a beta particle emitter (low energy electrons) made of Ni63 metal foil. The foil mounted inside of the housing of the detector is used for detecting the presence of halogen-containing compounds such as found in halogenated pesticides. The detector is a sealed unit that can be cleaned and serviced only by a technician or manufacturer licensed to handle radioactive materials. Since it is considered a radioactive source, specific rules must be followed when using, storing, and handling these detectors:

1. A general license for possession and storage of radioactive material must be maintained by the Laboratory Section. The license is issued by the Radiation Protection Section of NCDENR. The laboratory currently holds a license (number 092-2152-0G) issued on March 16, 2011. The laboratory Safety officer is the contact person for the lab.
2. Only authorized and trained personnel are to use the Electron Capture Detector equipment. Users are to ensure all operating procedures are followed to minimize exposure to this radioactive source. A transport container is to be used when taking the source out of the lab for cleaning.
3. Hand protection in the form of gloves is to be used when handling an ECD. Even if wearing gloves, a thorough washing of hands is to be performed after handling an ECD.
4. Laboratory employees should not open or otherwise tamper with an ECD.
5. As per State of North Carolina regulations (15A NCAC 11.0309), all ECD's in use are to be tested for leakage of radioactive material ("wipe tested") every six (6) months. Testing is not required for ECD's being held in storage, except for when they are scheduled for transport/disposal. Leakage tests must be performed by a person holding a specific license authorizing provision of this service. Test records for an ECD should be maintained by the laboratory safety officer until the ECD is removed from the lab.
6. If an ECD is replaced or will no longer be in use, the instrument manufacturer should be contacted to have the ECD removed from the lab. An ECD can be removed from an instrument by laboratory personnel, but should only be removed from the laboratory by the instrument manufacturer (or shipped to the manufacturer).
7. If an ECD is to be shipped to the instrument manufacturer, it must be transferred by licensed courier (e.g., FedEx). A report should be submitted to the Radiation Protection Section with the following information: identification of the device by manufacturer's name, model number, and serial number; name, address, and specific license number of person receiving the ECD; and the scheduled date of transfer.
8. ECD's that are no longer in use (not attached to an instrument) should only be stored in the lab temporarily (maximum of 3 months). Storage of ECD's is to be in Room G047, the Pesticide Instrument Room. Storage is to be in a locked storage area that is solely for radioactive material. The storage area is to be identified using the standard radioactive source marking signs.

22 PARTICULARLY HAZARDOUS SUBSTANCES

In the normal course of work in the Laboratory Section, employees may be exposed to chemicals that are designated as Particularly Hazardous Substances (PHS). A chemical identified as a PHS may or may not have severe acute effects, but with repeated exposure may pose a significant threat to human health. Exposure to a PHS may occur during procedures such as extraction or analysis of environmental samples, handling of chemical standards, or from the handling of environmental samples received from the field offices. Potential exposure routes include accidental ingestion, absorption through skin, eye contact, and inhalation.

A Particularly Hazardous Substance is a chemical or substance that falls under one or more of the following categories:

- (1) **Carcinogen or suspect carcinogen:** a chemical that may cause cancer after repeated exposures. Determined by one or more of the following:
 - OSHA publications, especially 29CFR1910, subpart Z, which is a list of carcinogens or potential carcinogens.
 - National Toxicology Program's *Annual Report on Carcinogens*, 12th Edition, which identifies substances that are known or reasonably anticipated to be human carcinogens.
 - IARC (International Agency for Research on Cancer) monographs, specifically chemicals that are listed in either Group 1 (carcinogenic to humans) or Groups 2A or 2B (probably or possibly carcinogenic to humans).
 - MSDS for a chemical or standard solution (see note below). This mainly applies to vendor-prepared standards which contain a multitude of compounds.

- (2) **Reproductive toxin:** a chemical confirmed as a reproductive toxin in the MSDS for the chemical (see note below). OSHA regulations (1910.1450) define reproductive toxins as "chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

- (3) **Compound exhibiting high acute toxicity:** a chemical for which the toxicity data from MSDS for chemical (see note below) fall within OSHA's criteria for high toxicity. According to OSHA, these compounds may be fatal or cause damage to target organs after a single exposure or repeated exposures of short duration. OSHA regulations (1910.1200 Appendix A) define a chemical as highly toxic if it falls into one of the following categories:
 - Oral: median lethal dose (LD50) \leq 50 milligrams per kilogram of body weight, as administered orally to albino rats.
 - Skin contact: LD50 \leq 200 milligrams per kilogram of body weight, as administered by continuous contact for 24 hours with the bare skin of albino rabbits.
 - Inhalation: median lethal concentration (LC50) in air of \leq 200 parts per million by volume of gas or vapor, or \leq 2 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour to albino rats.

Note that for MSDS forms, information regarding carcinogenic effects, reproductive toxicity, and acute toxicity will generally be located under sections titled *Hazards Identification* (potential chronic health effects) and/or *Toxicological Information*.

A table listing the chemicals and solutions used in the Laboratory Section that have been identified as Particularly Hazardous Substances is provided in the Forms Appendix.

22.1 Exposure Monitoring

Particularly Hazardous Substances for which inhalation is a significant exposure route should be monitored periodically. Exposure monitoring should assess the level of exposure at or near an employee's breathing zone. Exposure limits for air contaminants are published as Permissible Exposure Limits (PEL's), which are generally based on 8-hour work shifts. Air exposure limits are located in OSHA regulations (29CFR 1910.1000, Subpart Z, Tables Z-1 and Z2) and in MSDS forms.

Every effort is made to ensure that employees are not exposed to ambient air concentrations above the limits established by these regulations. If exposure monitoring of an employees' breathing zone indicates that exposure levels reach or exceed the limits for a PHS, then more rigid control measures should be instituted to include:

- Additional engineering controls
- Administrative controls such as limiting the exposure time
- Use of appropriate personal protective equipment.

22.2 Working With a Particularly Hazardous Substance

The key to safely working in close proximity to a particularly hazardous substance is limiting the amount of direct exposure an employee may have to the chemical or substance. General rules for working with these substances include:

1. If possible, work with a particularly hazardous substance under a fume hood. Verify that the fume hood is operating properly **BEFORE** beginning work with the substance.
2. Personal protective equipment that is appropriate for the substance must be in use whenever the substance is handled. At a minimum, safety glasses, gloves, and a lab coat must be worn while working with a PHS.
3. Communicate the hazards and emergency response procedures to all persons in the area **BEFORE** working with the substance.
4. Working with a particularly hazardous substance requires that at least one other employee is present in the work area. The other employee should be aware and knowledgeable of the procedure to be used, the potential dangers of the chemical or substance, and the emergency response activities in case of a spill or accident (decontamination procedures, waste accumulation and disposal procedures).
5. Information for a particularly hazardous substance should be included in the Standard Operating Procedure (SOP) or other written instructions for the procedure(s). Information should include the hazard presented by the chemical, potential exposure routes, any special protective equipment beyond the standard personal protective equipment, and emergency procedures for accidental spills of the chemical.

23 CHEMICAL WASTE MANAGEMENT

Waste is considered hazardous if it has one or more of the following characteristics:

- * Ignitability: flammable or easily combustible with flashpoint below 140° F.
- * Corrosivity: pH less than 2 or greater than 12.5, dissolves metal or burns skin.
- * Reactivity: unstable at standard temperature and pressure, releases explosive or toxic vapors
- * EP (extraction procedure) toxicity: toxic if extract from the waste is tested and found to contain concentrations of heavy metals or specific pesticides.

Many chemicals used in the Laboratory Section fall within the above parameters. Therefore, whenever wastes are generated from chemicals that exhibit ignitable, corrosive, and reactive or EP toxic characteristics, they are to be treated as hazardous wastes.

Solvent Waste Drums:

Organic solvent waste (flammable) is collected in two 55-gallon steel drums (interior lined with polyethylene) that are located in the solvent storage room (room G102). Each drum must be labeled as containing hazardous waste that is flammable and with the start date of addition of solvent waste to the drum. Only organic waste may be stored in the drums; no water, acids or bases should be added. Transfer of solvent waste from individual collection bottles (from lab units) to a drum should only be performed by personnel wearing the proper protective equipment (solvent-resistant gloves, respirator, and face shield). Transfer into a drum must be done only with a static-free funnel attached to one opening of the drum; the second drum opening should be partially opened for ventilation.

When solvent waste is added to a drum, the following information must be entered on an *Organic Solvent Waste Form* (see forms attachments) that is maintained for each drum: date, chemist, name of solvent, and volume of solvent (liters). The solvent waste drums should be inspected on a weekly basis and each inspection documented on an inspection log form (see forms attachments).

Solvent waste drums that are full should only be removed from the laboratory by a hazardous waste contractor. Hazardous waste manifests are to be completed whenever solvent wastes are removed from the Laboratory building.

Neutralization Tank:

The Laboratory Section has a two-stage sewage system. Laboratory drains in the lab units are separated from the sanitary drains (bathrooms and break room). The laboratory sink drains are plumbed to combine waste water from all of the lab unit sinks and transport the water to a neutralization tank. The neutralization tank has a 1200 gallon capacity and contains 9000 pounds of limestone pellets (calcium carbonate); limestone for the tank should be replaced every 2 to 3 years, or when there is any indication that the limestone is no longer properly neutralizing the lab waste water. The limestone acts to neutralize the waste water (which can contain acidic and alkaline solutions) and the neutralized water is then passed into the normal sanitary sewer system. The sanitary drains bypass the pretreatment phase and drain directly to the sanitary sewer system.

Additional guidelines regarding hazardous waste and chemical waste management:

1. Each laboratory unit must maintain clearly labeled, closed containers for the collection of hazardous chemical wastes.

2. All receptacles for hazardous waste should be resistant to the materials and should be placed in a chemically resistant tray of sufficient volume to contain a rupture of the primary container.
3. Liquid wastes are to be stored in screw-capped bottles or safety cans. Maintain a headspace when filling containers.
4. Chromatography needles, Pasteur pipets, and broken glass should be placed into containers designated to contain broken glass.
5. Waste solvents will be segregated into solids and liquids. Liquids will be segregated into acids, bases, aqueous, and organic solvents. Segregating the waste at the source makes disposal easier and less expensive.
6. Other chemical wastes (e.g., heavy metals, cyanides, carcinogens, outdated laboratory chemicals, contaminated protective clothing) will be accumulated in separate containers to avoid incompatible chemical reactions.
7. Any excess hazardous chemicals or reagents from lab units may be transported to the acid and solvent waste storage rooms for temporary storage. These chemicals should only be removed from the lab by a hazardous waste contractor, and a manifest must be completed any time hazardous chemicals are removed from the lab.
8. On an annual basis, the Laboratory Section should evaluate the hazardous waste reduction program as per the Hazardous Solid Waste Amendments to the Resource Conservation and Recovery Act.

24 BIOLOGICAL WASTE MANAGEMENT

Biological wastes are to be handled as follows:

1. Petri dishes used for plating out colony cultures are to be placed in an autoclavable biohazard bag and sterilized prior to disposal.
2. Biological contaminants and areas they are stored must be labeled properly and are to be clearly marked as having potential biological contamination.

FORMS APPENDIX

New Employee Safety Orientation and Training

Date of Orientation:	
Name of Employee:	
Orientation Instructor:	

Safety Plan Review

- Emergency Actions and Notification
- Reporting Laboratory Accidents
- Fire Prevention Guidelines
- Housekeeping Rules, Clothing and Personal Items
- Recognizing work area hazards

Personal Protective Equipment

- Location
- Instructions for Use (including cleaning, repairing and replacing)

Evacuation Plan

- When/where to Evacuate
- Alarm System (including tests and fire drills)

General Laboratory Hazards

- Hazardous Equipment
- Non-hazardous Equipment
- Electrical Hazards
- Compressed Gases
- Vacuums
- Noise Exposure
- Fume Hood Use

- When one should use the Fume Hood
- Operation of the Fume Hood

Chemicals used in the Laboratory

- Inventory of Chemicals used in the Laboratory
- Hazard Classes of Chemicals used in the Laboratory

- Material Safety Data Sheets
- Storage
- Extremely Hazardous and Toxic Materials

- Transporting Chemicals
- Hazardous Waste Disposal

- _____
- _____

By signing, the employee verifies that he/she has received, read and understands the information checked above.

Signature of Employee	Date	Signature of Instructor	Date
M:/LABFORMS/TRF-005-1(NES)			rev. 5/04

CHP ORIENTATION TRAINING

Date of Training: _____

Name of Employee: _____

Trainers: Steve Kaasa _____
(and initials)

- Hazard Communication Review** (29 CFR 1910.1200)
 - Hazard Classes of Chemicals used in the Laboratory
 - Material Safety Data Sheets
 - Labeling
 - Storage and Handling Chemicals

- CHP Review** (29 CFR 1910.1450)
 - Emergency Actions and Notification
 - Fire Prevention Guidelines
 - Housekeeping Rules, Clothing and Personal Items
- Personal Protective Equipment**
- Evacuation Routes**
- General Laboratory Hazards**
 - Recognizing work area hazards
 - Electrical Hazards
 - Compressed Gases
 - Vacuum
 - Radioactive Hazards
 - Noise Exposure
 - Fume Hood Use
- Chemicals used in the Laboratory**
 - Extremely Hazardous and Toxic Materials
 - Transporting Chemicals
 - Chemical Waste Disposal
 - Biological Waste Disposal

4405 REEDY CREEK ROAD RALEIGH, NC 27607-6445
1623 MAIL SERVICE CENTER RALEIGH, NC 27699-1623
TEL. (919) 733-3908 FAX (919) 733-6241

(This confidential information will be kept in a sealed envelope in your personnel file and with your supervisor. It will only be used in the event of a real emergency.) Update this form if the information changes.

NAME _____ DATE _____
(First) (Middle Name) (Last)

HOME _____
ADDRESS (Street Number and Name) (City) (State) (Zip) (County)

AGE _____ DATE OF BIRTH _____ RACE _____ SEX _____ MARITAL STATUS _____

SOCIAL SECURITY # _____ HOME PHONE _____

PRIMARY PHYSICIAN _____ TELEPHONE _____

MEDICAL PROVIDER _____ IDENTIFICATION # _____
(****ATTACH COPY OF MEDICAL HEALTH CARE PLAN CARD****)

SPECIAL MEDICAL INFORMATION

Do you wear contact lenses? Yes _____ No _____ Are you an organ donor? Yes _____ No _____
Current Prescription Medications (Name, dosage, frequency)

Do you currently have any medical condition or allergy that should be made aware to others? Yes _____ No _____
If so, please use the following lines and back of sheet to explain the procedures to follow in case of emergency

PERSONS TO CONTACT IN CASE OF EMERGENCY

NAME _____ RELATIONSHIP _____

HOME _____
ADDRESS (Street Number and Name) (City) (State) (Zip)

EMPLOYER _____ WORK PHONE _____
(Area Code) (Number)

HOME PHONE _____ CELL PHONE _____
(Area Code) (Number) (Area Code) (Number)

NAME _____ RELATIONSHIP _____

HOME _____
ADDRESS (Street Number and Name) (City) (State) (Zip)

EMPLOYER _____ WORK PHONE _____
(Area Code) (Number)

HOME PHONE _____ CELL PHONE _____
(Area Code) (Number) (Area Code) (Number)

Fire Drill Checklist - DWQ Laboratory Section

Location of Fire Drill:	4405 Reedy Creek Road, Raleigh, NC 27607	
Date of Fire Drill:		
Person(s) Conducting Fire Drill:		
Person that Activated Fire Alarm:		
State Capitol Police Notified?	YES	NO
Time when Fire Alarm was Activated:	AM / PM	
All employees accounted for?		
Volatiles Unit:	YES	NO
SV/Pesticides Unit:	YES	NO
Biochemistry Unit:	YES	NO
Metals Unit:	YES	NO
Front office / Receiving Area:	YES	NO
Elapsed Time to Evacuate Building:		
Fire Alarm Heard Clearly in all Areas?	YES	NO
Doors to Lab Units Closed?	YES	NO
Corridors and Exits Clear of Obstructions?	YES	NO
Weather Conditions at Time of Drill:		
Comments and Notes:		

Laboratory Section – 4405 Reedy Creek Road, Raleigh, NC Emergency Evacuation Plan



Parking Lot

Parking Lot

Parking Lot

▼ Reedy Creek Rd ▼

Assemble In Grassy Area

▼ North ▼

List of Particularly Hazardous Substances, Laboratory Section, 4405 Reedy Creek Road

Chemical	Chemical Form	Location in Laboratory	Source of Hazard Designation
Carcinogens			
Benzene	Component of VOC mixture	Volatiles	OSHA ¹ , NTP ² , IARC (1) ³ : known carcinogen
Beryllium	Component of standard mixture	Metals	NTP, IARC (1): known carcinogen
Cadmium	Solid; component of standard mixture	Nutrients; Metals	OSHA, NTP, IARC (1): known carcinogen
Chloroform	Liquid	Wet Chemistry	NTP, IARC (2B): suspect carcinogen
Chromic acid	Component of digestion solution	Wet Chemistry	MSDS (contains chromium (VI))
Chromium (VI)	Component of standard mixture	Metals	OSHA, NTP, IARC (1): known carcinogen
Formaldehyde	Liquid	Wet Chemistry	OSHA, NTP, IARC (1): known carcinogen
Lead compounds	Component of standard mixture; lead acetate	Metals; Wet Chemistry	NTP, IARC (2A): suspect carcinogen
Methylene chloride	Liquid solvent	SV/PE ⁴	OSHA, NTP, IARC (2B): suspect carcinogen
Phenolphthalein	0.5% Solution	Wet Chemistry	NTP, IARC (2B), MSDS: suspect carcinogen
Standards for SV/PE ⁵	Vendor-prepared standard mixtures	SV/PE	MSDSs for standards
Standards for Volatiles ⁵	Vendor-prepared standard mixtures	Volatiles	MSDSs for standards
Vinyl Chloride	Component of VOC Gas mixture	Volatiles	OSHA, NTP, IARC (1): known carcinogen
Reproductive Toxins			
Ether	Liquid	SV/PE	MSDS
n-Hexane	Liquid	Wet Chemistry	MSDS
Lithium	Component of standard mixture	Metals	MSDS
Mercury	Component of standard mixture, thermometers	Metals	MSDS
Pyridine	Liquid	Wet Chemistry	MSDS
Sodium Tetraborate	Solid	Nutrients	MSDS
Toluene	Liquid	Organics	MSDS
Substances with High Acute Toxicity			
Phenol	Liquid	Nutrients	MSDS
Potassium cyanide	Component of standard solution	Wet Chemistry	MSDS
Standards for SV/PE	Vendor-prepared standard mixtures	SV/PE	MSDSs for standards

¹ OSHA = Occupational Safety and Health Administration² NTP = National Toxicology Program³ IARC = International Agency for Research on Cancer (carcinogen grouping: 1 = known; 2A = probable; 2B = possible)⁴ SV/PE = Semi-volatiles and Pesticides⁵ Vendor-prepared standards for the SV/PE and volatiles units contain components that are carcinogenic; please refer to MSDSs for more information.**Date Prepared: 7/2012**