Chemical Hygiene Plan
Washington Regional Office Laboratory

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Fume Hood Airflow Map

Chemical Hygiene Plan Overview

In the daily performance of your duties in the laboratory, it may be necessary for you to work with potentially hazardous chemicals and equipment. This may include, at least:

Chemicals that may be:

- Flammable
- Corrosive
- Explosive
- Carcinogenic
- Toxic
- And/or equipment that may be:
- Potential biological hazards.
- High temperature or high voltage.
- Hyper- or hypobaric

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 the Division, become familiar with:

- The location of the safety equipment.
- The nearest exit, the evacuation route to that exit and the outside assembly area.
- The location of the closest fire alarm pulls and fire extinguishers.
- The location of the unit Material Safety Data Sheets (MSDS).
- CHP Applicability
- The OSHA standard that governs use of or handling of hazardous chemicals in a laboratory setting is 29 CFR 1910.1450. This standard only applies to what is termed "laboratory use" of 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.
- Multiple chemical procedures or chemicals are used.
- Operations involved are not part of 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:

- *Capable of protecting employees from health hazards associated with hazardous chemicals in that laboratory and*
- *Capable of keeping exposures below the limits specified in paragraph (c) of this section.*
-

(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;

- *Standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals.*
- *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.*
- *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.*
- *Provisions for employee information and training as prescribed in paragraph (f) of this section.*

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

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:

Laboratory Section Chief

The overall responsibility for the Chemical Hygiene Plan rests with the Laboratory Section Chief. The Laboratory Section Chief 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.

Chemical Hygiene Officer

The Chemical Hygiene Officer (CHO) is the primary person responsible for ensuring the CHP is carried out 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.
- Develop 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 with in 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, which 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.

Laboratory Supervisor

The Laboratory supervisor is responsible for ensuring this Plan is carried out at the work level. At a minimum, the supervisor is responsible for:

- Providing safe working conditions for all employees.
- Knowing and implementing the safety and health standards or regulations applicable to the Laboratory.
- 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 Section Chief, 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 the use, care, and storage of the personal protective equipment.
- Establishing, maintaining and updating annually records of particularly hazardous substances on hand, amounts used, and names of users. Copies of these records are to be submitted to the Division Safety Consultant every year, by January 1st. The records are to be maintained for 30 years.

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 endanger yourself or your coworkers.
- Use prescribed safety equipment and personal protective equipment as indicated in the Laboratory standard operating procedures.
- Report ANY unsafe condition or act of a coworker to your supervisor, or additionally to the Division Safety Consultant.

Accident/Incident Reporting

Any injury, accident or near miss incident is to be reported to your supervisor by the end of your work shift. Failure to report an injury in a timely fashion may disqualify you 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 any doubts exist doubts about the severity of an injury or accident do not hesitate to call for outside emergency help and begin to initiate a building evacuation where appropriate. For additional accident and incident reporting procedures, see the Division policy memorandum entitled Accident & Incident Reporting Procedures. This memorandum is contained in the Forms Section.

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.

Non-Fatal Accidents and Injuries

ALL INJURIES, no matter how minor, must be reported to the Laboratory supervisor by the end of the work shift. The accident can be reported orally or by using an Industrial Commission Form 18, "Notice of Accident to Employer" shall be used to report to the Laboratory supervisor.

Upon receiving a report of accident by Form 18 or orally, the Laboratory supervisor shall conduct an investigation using the "Accident Investigation Form" and any additional investigation forms, as necessary. Following the investigation, the supervisor is to complete the Industrial Commission Form 19, "Employers Report of Injury to Employee". These forms are to be forwarded to the Regional Office Administrative Office, Division Safety Consultant and to the appropriate Branch Head.

During the investigation, any Job Safety Analyses that have been completed should be reviewed to determine if modifications to processes or procedures are to be instituted.

First aid treatment will be available for minor injuries or if the injury requires, the affected employee(s) will be sent to specified doctors or treatment centers.

Reportable accidents are to be entered into the Division OSHA 300/300A log. This log will be maintained by the Division Safety Consultant and the Regional Office.

The OSHA 300/300A form for the Regional Office, for the preceding year, is to be posted on the employee bulletin board during the months of February, March and April. The Regional Office specific OSHA 300/300A logs will be provided by the Regional Office.

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 are to 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	Stephen Kaasa	Office - 919/733-7015, ext. 241
Division Public Affairs Officer	Susan Massengale	Office - 919/733-7015, ext. 228
Division Director	Alan Klimek	Office - 919/733-7015, ext. 203
DENR Safety Officer	Chuck Stanfill	Office - 919/715-4509
DENR Public Affairs Officer	Don Reuter	Office - 919/715-4112

The Department Secretary and / or Governor will be notified by the Department Safety Officer. For incidents occurring after normal working hours, or on weekends and holidays, contact the NC Dept. of Labor at **1-800-LaborNC**. They will log the report and forward it to NC OSH on the next work day.

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

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

- Name of person(s) involved.
- Location of incident.
- Time of incident.
- What conditions led to incident.
- How incident occurred.
- Contact telephone number.
- Location of involved employee(s).

Safety Inspection Procedures

The regularly scheduled safety inspections of the facilities and procedures will use the Safety Inspection Form for the Laboratory Section. This form is found in the "Forms Appendix" of this manual. Representatives of the Laboratory Safety Committee will conduct the inspection, accompanied by the Laboratory supervisor. Each area of the Laboratory is to be inspected at least annually. Needed corrective measures will be recorded on the form, discussed at the next scheduled Safety Committee. Appropriate changes to practices will be recommended to the laboratory supervisor

Incident Investigation

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:

- Did an unsafe act or condition cause the accident/incident?
- 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?

CHP Training

It is the direct responsibility of the Laboratory supervisor 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.

New Employee Orientation and Training

On employment with the Laboratory Section, new personnel will receive a copy of the DENR Safety Manual (http://h2o.enr.state.nc.us/admin/sso/safety/denrsafe/handbook/toc.pdf) and a copy of the Chemical Hygiene Plan (http://www.esb.enr.state.nc.us/lab/bottle/chp-waro.pdf). New employees will be required to sign a statement indicating that orientation information was made available, that the Chemical Hygiene Plan was reviewed, and that the information contained in those documents is understood. Supervisors 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.
- Regional Laboratory Specific Chemical Hygiene Training

Employees will be apprised of the hazards present in the workplace upon initial assignment to the Regional laboratory or whenever new chemicals or processes are introduced into the work area. 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 Laboratory Standard and how it applies to the Regional laboratory.
- The location and general contents of the Regional laboratory 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 Regional laboratory.
- The detection of leaks or releases of chemicals in the Regional laboratory and specific cleanup procedures to be used.
- The personal protective equipment required to be used in the Regional laboratory.

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.

CHP Medical Surveillance

All personnel employed in the Laboratory section will receive a baseline physical when beginning work in the Laboratory. Employees will also receive a physical each year while in the employ of the Laboratory Section. These examinations are provided at no cost to the employee. A medical history will be compiled, a pulmonary function test will be performed, and specific blood tests may be performed. During the baseline and periodic 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 you may be exposed.

Visitors to the Laboratory

Persons not in the employ of the Laboratory Section are considered visitors to this site. Access to the laboratory is to be regulated since this building does enforce policies regarding Chain of Custody for some of the samples entering the 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 located at the reception area. Visitors are to be met at the reception area by the employee who the visitor is requesting to see. Visits to the laboratory will be at the discretion of the Laboratory supervisor.
Prior to entering a restricted area, visitors will receive a safety review for the specific area before they proceed to that area. Visitors will be issued appropriate personal protective equipment for that area. Repair, 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.

Visitor injuries require the "Supervisor's Report of Accident" be completed and forwarded to the Administrative Office Manager, Regional Supervisor, the Laboratory Section Chief, and the Division Safety Consultant.

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 State of North Carolina, Department of Labor, 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 CHO, the Division Safety Consultant and the Division Director or his representative. If substantial changes are made to the Plan during this process, all Asheville Region Laboratory Section employees will receive training in the changes made to the Plan.

CHP Emergency Response

General Information
The potential for an emergency to occur at the Washington Regional Office Laboratory is very real. The laboratory deals with potentially hazardous chemicals, 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
- Biological Contamination
- Security Threats

Building Evacuation
In the event of a building evacuation, proceed to the assigned assembly area, which is the front parking lot of the building. Do not return to the building until instructed to do so by appropriate building administrative staff. A roll call of employees will be made by appropriate building administrative staff to ensure all personnel on duty or visiting have evacuated. In the case of an evacuation due to chemical spill, the MSDS file is to be taken outside during the evacuation.

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

Specific Evacuation Procedures

Fire
Activate the closest pull alarm. Leave the area and ensure that all other personnel in the affected area have left.
Call 9-911 to activate the fire emergency services. Assemble at the designated outside assembly area (The front parking lot of the building).

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

Chemical Spills

General
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 clean-up 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 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 asphyxiating, explosive, highly reactive or hazardous, etiologic, or flammable chemicals, proceed with the general evacuation procedure.

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.

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

Response Steps for Chemical Spills

- Control Spill Area and Leave.
- Alert others in the area, building administrative staff and immediate supervisor as soon as a spill occurs.
- Consult the MSDS for spill Control procedures specific to the chemical CAUTION: some materials become corrosive, irritating and otherwise hazardous on contact with water.
- Help any injured personnel.
- Remove personnel from spill area.
- Remove contaminated clothing, flush skin with copious amounts of water (if chemical is not water reactive), use eyewash and emergency showers if necessary.
- Seek professional medical attention if substances are splashed in eyes, and/or if burns or respiratory problems are evident.
- Evaluate the hazard
- If it appears that the spill is too large to be easily contained and cleaned up, call 99-911 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.
- If there is no fire hazard and the material is not particularly volatile or toxic, clean it up as soon as possible.
- Clean up the spill

Avoid skin 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 clean-up 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 trash cans in the work area. Dispose of them according to the MSDS sheets. DO NOT THROW WASTE IN THE TRASH CAN.

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. Most solid spills can be brushed up and disposed of in appropriate solid-waste containers, but care must be taken to avoid reactive combinations.

Spills Involving Specific Types of Chemicals

Acids
Concentrated Acetic, Nitric, Phosphoric, Sulfuric, Dilute Hydrochloric;
For large spills of 500 ml or more use spill control pillows to soak up as much acid as possible. Follow the instructions on the pillow dispenser box.
Place the used pillow in a plastic bag for later disposal. Neutralize the remaining acid with an acid spill cleanup kit, following the instructions on the kit.
Used pillows should be neutralized with lime and disposed of. Small spills may be treated directly with spill cleanup kits.
CAUTION: Most pillows cannot be used with HF.

*Caustics (*e.g. Ammonium Hydroxide, Sodium Hydroxide)
For large spills (500 ml or more), use spill control pillows, following dispenser box instructions. Place used pillow in a plastic bag for later disposal. Neutralize remaining spill with caustic spill cleanup kit following instructions on the kit. Small spills may be treated directly with spill cleanup kit.

Concentrated Hydrochloric
Cover spill with vapor barrier sorbing blanket, make sure fume hoods are operating at maximum flow rate. Use spill control pillows if necessary. Neutralize spill with acid spill cleanup kit. Local evacuation may be necessary to prevent exposure to corrosive fumes (see Evacuation Plan section of this document.)

Mercury
Because of the high toxicity of mercury vapor, spilled mercury should be immediately and thoroughly cleaned up by using a mercury spill cleanup kit or 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.

Mercury spilled into floor cracks can be made nonvolatile by amalgamation with zinc dust or sulfur powder.
Domestic vacuum cleaners MUST NOT be used because they will only re-disperse mercury aerosols and spread the contamination. A mercury vapor monitoring instrument should be available for determining the effectiveness of the cleanup.

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 profession medical attention. Types of medical emergencies may include deep cuts or punctures, thermal or chemical burns, eye injuries, and similar conditions. If a person can be transported SAFELY and without any further injury or aggravation, use of employee automobiles can be utilized. However, if there is any doubt concerning additional aggravation of an injury, call 9-911 request an ambulance or other emergency service response to your area. Give the location physical address of the building (943 Washington Square Mall). Stay on the telephone until instructed by the emergency services operator.

Other Threats

Other threats may necessitate a general evacuation. 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.

Drills

Drills or tests of the general evacuation procedures will be performed on an irregular basis throughout the year. Treat all evacuation drills seriously.

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 must be replaced at personal expense. The Laboratory Section's central laboratory in Raleigh maintains a washer and dryer for laundering of certain articles. Asheville Regional Office Laboratory personnel must send lab coats to Raleigh to be washed. The lab coats should be shipped in a secured ice chest by State courier

Hazard Assessment

The Division Safety Consultant, in conjunction with the CHO, and employees of the Laboratory will perform job hazard assessments periodically. The reason for the job hazard assessment is to indicate any and all personal protective equipment that will need to be worn 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.

Eye Protection

Division policies require the use of eye protection when there is a reasonable probability of eye injury. Protective devices are required to be worn in all areas identified as Eye Hazard areas by employees and visitors. There are no exceptions to this policy. Contact lenses can trap and retain chemicals. Therefore, contact lenses will not be worn in areas where laboratory chemicals are used or stored.

Types of Eye Protection
Various types of eye protective gear may be used in the laboratory. The specific type will be determined during the Job Hazard Assessment. Various types and sizes will be made 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 eye wear above the authorized cost will be borne by the employee.

Eye Wash Equipment
Safety eye wash equipment is located in the main Laboratory room. 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

TWENTY MINUTES. The eye wash station is to be tested on a regular basis to ensure this equipment is operating properly. Appropriate documentation of the testing will be maintained by the CHO.

Face Protection

A full face visor is to be worn when:

- Using acids (> 1N) or bases (> 1N)
- Using flammable solvents
- Heating glassware
- Using equipment when contents are under pressure including the autoclave

Hand Protection

Gloves, of the appropriate type are to be worn when handling samples, chemicals, heat sources, extremely cold (subzero F) substances and when opening the autoclave. Thermal gloves are to be worn when handling extremely cold objects or substances. Appropriate chemical protective gloves are to be worn when handling chemicals. Hands are to be washed thoroughly and immediately if contaminated with chemicals. Any dermatitis or allergies are to be reported to your supervisor.

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. Asheville Regional Office Laboratory personnel can have lab coats sent to the Reedy Creek Laboratory to be washed. The lab coats should be shipped to the Reedy Creek Lab in a secured ice chest by State Courier. Chemical resistant aprons are to be worn when handling caustics, acids greater than 6N or bases greater than 2N and when opening the autoclave.

Respiratory Protection

The environment of the laboratory 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 Respiratory Protection program.

First Aid

General

Any injury that occurs to you while on the job is to be reported to the immediate supervisor. Within the Division of Water Quality, no personnel are designated as first aid responders. Therefore, if any injury is greater than a minor cut or scratch, medical attention is to be secured from medical providers. If medical attention is sought, the incident is to be formally reported, in writing, to the immediate supervisor and to the Division Safety Consultant. See Section 6, Accident and Incident Reporting for further information.

Chemical Overexposure and First Aid

If an employee is overexposed to a chemical, speed is essential. For skin or eye contact, immediately flush the area with water for a minimum of 20 minutes. For serious chemical exposures, employees are to be transported to the closest medical facility via emergency medical services. A copy of the MSDS is to be taken with the employee so that the medical provider will know the type(s) of chemical(s) involved.

Chemical Contact to the Body

Quickly remove all contaminated clothing while using the safety shower. Waste no time, seconds count. However, be careful not to spread the chemical on the skin or into the eyes. Immediately flood the affected body area with cold water for at least 20 minutes. Resume if pain returns. The safety shower is located in the main room of the laboratory.

Wash off chemicals with a mild detergent and water, but do not use neutralizing chemicals, unguents, creams, lotions, or salves. 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.

First Aid Equipment on Site
The Washington laboratory has a first aid kit on site. This kit is located on the BOD counter. This kit is to be used for minor injuries only. The kit contents will be checked when the Drench Shower is tested and refilled as necessary.

First Aid Training
All employees throughout the Division will have the opportunity to have First Aid and CPR 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 Adult CPR practices through the National Safety Council in conjunction with the North Carolina Council on Safety and Health.

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:

- 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.
- 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. Glassware is to be rinsed immediately following use to prevent others from coming in contact with residues left in or on the items.
- Work areas are to be cleaned promptly after use and to be kept free from obstruction.
- Equipment and chemicals are to be stored and labeled properly.
- 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.
- Floors are to be cleaned regularly.
- Stairways and hallways are not to be used as storage areas.
- Access to exits, emergency equipment, and building control devices are not to be blocked.
- Broken glassware is to be placed in the broken glassware container. When full the container can be disposed in the trash dumpster.

Laboratory Fire Safety

Fire System Controls
Fire extinguishers are placed through out the Laboratory. All personnel are expected to know the location of the fire extinguishers. Fire extinguishers are only to be used in incipient stage fire control. The Washington Regional Office 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, shut down any critical procedures, leave your work area, close the door as you leave the room and leave the building. Assemble at your defined assembly area. Your supervisor 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.

Fire Extinguishers
Fire extinguishers are provided in each of the laboratory rooms. Fire extinguishers are to be used for incipient stage fire fighting only. The laboratory's fire extinguishers are of Type BC. The following is a list of the various types of 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.
- Class D used on fires involving combustible metals

Other Fire Safety Equipment
A Fire Blanket is located on the office wall facing into the laboratory. An emergency drench shower is located in the main lab room.

Fire Extinguisher Inspection and Training
Each fire extinguisher is to be visually checked on a monthly basis to ensure the extinguisher is in operational condition. An annual maintenance check of all extinguishers is to be performed and documented. Hydrostatic testing of the extinguishers is to be performed for all extinguishers every twelve years. All personnel will be instructed in the basic fire hazards associated with normal operations during their initial assignment training and on an annual basis thereafter.

Fire Prevention Procedures
All employees need to have an understanding of the potentials for fire for 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 chemical reagent material safety data sheets and the operator's manuals for instrumentation and equipment.

Assume that a fire will take place. Be aware of the possibility of fire and plan accordingly. Laboratory fires are generally localized and small in size. 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:

- Smoking is prohibited in the building.
- Notify the laboratory supervisor or additionally, safety personnel of potentially dangerous situations.
- Do not use an open flame to heat a flammable liquid or to carry out a distillation under reduced pressure.
- Use an open flame only when necessary. Before lighting a flame, remove flammable materials from immediate area.
- To prevent the formation of flammable mixtures, insure that adequate ventilation occurs by using the exhaust hood during transfer or analysis of flammable solvent(s).
- Store flammable materials properly.
- Containers must be properly labeled.
- Flammable liquids are to be stored in NFPA approved ventilated storage cabinets.
- 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.
- When dispensing and handling flammable substances, insure that area is free from ignition sources.
- Use grounding straps when transferring flammable liquids to eliminate sparks created by static electricity.
- Place waste material that is impregnated with flammable materials in an appropriate waste storage container.

Compressed Gases

The laboratory uses a central supply of natural gas. It is used with a Bunsen burner to flame sterilize forceps.

Electrical and Mechanical Hazards

Electrical Hazards
DO NOT TOUCH a person in contact with a live electrical circuit. DISCONNECT THE POWER FIRST or you may be seriously injured. All laboratory personnel should know the location of the circuit breakers and how to cut off all electrical service to the laboratory in case of an accident. 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 are to have ground fault circuit protection.

Eliminate wiring that is frayed, worn or stretched across the floor where someone could trip over it. Avoid obstructed switch gear and panel boards, unlabeled panel boards, electrical outlets with open (or missing) cover plates, and excessive use of extension cords. Label all high voltage equipment. Beware of the explosion hazard of hot plates and flammable liquids under the hoods. Keep the area clear around cooling fans and vents.

No flammable gases should be stored near high voltage (or hot) equipment. Keep electrical cords free and not kinked. Turn off unnecessary electrical devices during weekends and holidays. Request the purchase of new equipment to replace damaged machines or electrical devices.

Have computers connected to surge supressors. Avoid overloading sockets with multiple plugs for related equipment. Keep paper waste away from power sources. Keep desk lamps in safe locations. Keep refrigerator coils and wiring free of dust and trash. No hanging decorations or devices from the ceiling lights. Do not crowd electrical appliances with other things such as boxes, piles of paper, or other equipment. Display warning signs on or near the main power switch of each electrical instrument.

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 sources of open electrical contacts inside the storage cabinet, including lights and butter bin, and by having the door closure replaced with easily opened magnets. The motor and other electrical parts on the exterior of a domestic refrigerator can still ignite flammable vapors in a room.

Mechanical Hazards

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. Guards, guarding devices, or interlocks are not to be defeated or removed from equipment. When performing maintenance on guarded or interlocked equipment, proper the 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 maintaining 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. Personnel performing maintenance procedures on equipment are to wear appropriate personal protective equipment. Compressed air is not to be used cleaning purposes unless the air pressure has been reduced to less than 30 psi.

Vacuum

The term "vacuum" refers to the condition of an enclosed space that is devoid of air or other gases or other material content. In the Laboratory 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 Division is on the order of five (5) to ten (10) in. Hg vacuum. A vacuum apparatus presents the following hazards:

- *Implosion*-This 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 use. Reduce the possibility of flying glass by placing strips of plastic electrician's tape on all large glass evacuation vessels.

- *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.

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. Never apply a vacuum to a flat-bottomed flask unless it is very small or it is a heavy-walled filer flask designed for filtration. 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.

Autoclaves

Laboratory personnel are to follow the manufacturer's operators manual while using autoclaves. Each operator is to make sure he or she is knowledgeable of all operating controls and safety devices before operating the autoclave. 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. Determine correct sterilization time by referring to minimum sterilization time chart.

When the chamber pressure gauge located at the top of the control housing reads zero, the door may be opened.
The lever action of the safety valve must be free to operate unrestricted at all times. Allow sterilizer to cool to room temperature before performing any cleaning or maintenance procedures. Always wear protective gloves, apron and face when opening a closed autoclave. Protective gloves, face shield and apron should also be worn when reloading a hot sterilizer following previous operation.

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 ordinary glass bottles or any container not designed for sterilization. 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.

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. The sterilizing chamber must be cleaned and drained after each use by rinsing the chamber thoroughly with clear water. Drain and leave open to dry overnight.

Chemical Fume Hoods

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

- Procedures involve the use of volatile chemicals.
- 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.

Chemical Fume Hood Use
Always have an emergency plan which describes proper procedures to follow in event of hood failure. Turn off hood power, cease operation, pull sash down and evacuate, if needed. Hoods are not to be used for storage of chemicals. Work is to be carried out with no obstacles 6” from front. Hood work areas are to be clear of unnecessary equipment and materials that can disrupt airflow and block vents. Experiments 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 by carrying equipment in and out during a procedure. Doors adjacent to chemical fume hoods in use are to be kept closed, with normal room traffic rerouted to another room entrance door, while an experiment is in progress. Use equipment with legs or feet whenever possible to allow airflow underneath apparatus.

When working with chemicals that have heavier than air vapors, adjust the inside bottom baffle to wide open and the inside top baffle to partially closed as an aid in collecting the heavier than air vapors. When working with lighter than air vapors, reverse the above procedure to induce additional airflow near the top of the hood.

Apparatus in the hoods should be fitted with condensers, traps, or scrubbers to contain or collect solvent or toxic vapors. When experiments in the hoods are completed, the hood is to be cleaned with an appropriate cleaner, and the hood sash is to be closed.

Hood Evaluation
Chemical fume hoods are to be evaluated for adequate air flow on a quarterly basis. A written record of the evaluation results will be maintained for one (1) year. 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.

Fume hoods will be adjusted to draw between 80-120 lfpm. Since safe operation is site specific and depends on the work conducted, there may be individual cases that require a velocity outside this standard range. Exceptions to the standard will be decided on a case by case basis based on discussions between the Laboratory supervisor, the CHO and the Division Safety Consultant.

Instruction in proper hood practices will be given to all lab workers during the initial job assignment orientation. Employees are not authorized to perform maintenance on the operational controls of any chemical fume hood.

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, and contaminants in industrial wastewater samples. Proper handling of potentially contaminated samples can be achieved as follows:

- Use appropriate personal protective equipment to protect against splash, spray, spill, or physical contact.
- Equipment used to contain or used in test procedures involving biological material hazards are to be autoclaved prior to washing.
- Petri dishes used for plating out colony cultures are to be placed in an autoclavable biohazard bag and sterilized prior to disposal.
- Storage areas for biological contamination are to be clearly marked and labeled as areas with potential biological contamination.
- Storage of biological contaminants must be labeled properly with the label indicating the potential for biological contamination.
- Spills containing biological contaminants are to be cleaned up immediately, with contaminants placed in an appropriate biological material hazard bag. An appropriate antibacterial agent is to be used on surfaces contacted by spilled material.
- Work surfaces where biological materials have been handled are to be cleaned at the end of each work shift using an appropriate antibacterial agent.

Particularly Hazardous Substances

In the normal course of work in the Laboratory Section, employees may be exposed to various chemicals that are considered particularly hazardous chemicals. Exposure to a particularly hazardous substance may come from normal testing procedures such as extractions, chemical standards, or may be contained in samples. These chemicals are generally designated as "select carcinogens" by the Laboratory Standard, and may be reproductive hazards or acutely toxic materials. A "select carcinogen" is a substance or work process that is listed in:

- OSHA publications under substance specific regulations.

- The National Toxicology Program's Annual Report on Carcinogens as a known or anticipated carcinogen.
- The IARC monographs.
- CERCLA, RCRA and other EPA regulations covering environmental pollutants.

Substances on these lists that are in use in the Laboratory Section include but are not limited to chemicals such as:

- Benzene
- Formaldehyde (and formalin derivatives)
- Methylene chloride (dichloromethane)
- Toluene
- (Possibly) standards used for test calibration.

Exposure Monitoring

The key to working in close proximity to a particularly hazardous substance lies in limiting the amount of direct exposure and employee may have with the substance. Exposure monitoring of an employee's work environment is performed whenever a particularly hazardous substance from the OSHA substance specific regulations is encountered (Subpart Z). Substances used in the Laboratory Section that fall in this category are:

- Benzene
- Formaldehyde (and formalin derivatives)
- Methylene Chloride (Dichloromethane)
- Toluene

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 the employees breathing zone indicates that exposure levels reach the "action level", then more rigid control measures will be instituted to include:

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

<u>Working with a Particularly Hazardous Substance</u>
Work with the particularly hazardous substances only under an approved fume hood. Ensure the fume hood is operating properly PRIOR to beginning work with the substance. Communicate the hazards and emergency response procedures to all persons in the area PRIOR to working with the substance. Working with a particularly hazardous substance requires that at least another person is present in the area, and is aware and knowledgeable of the procedure to be used, the potential dangers of the procedure, and the emergency response activities in case of a spill or accident, decontamination procedures, waste accumulation and disposal procedures.

Personal protective equipment that is appropriate for the substance must be in use whenever the substance is handled. A written experiment plan, with a hazard evaluation, must be available, must be reviewed prior to working with the substance, and must be followed whenever the substance is used.

Chemical Waste Management

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

- Ignitability: flammable or easily combustible with a flashpoint below 140^0 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.

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

laboratory drains are collected and passed through a calcium carbonate filter to neutralize acids, and then are passed into the normal sanitary sewer system.

Clearly identified closed containers for the collection of chemical wastes must be maintained. Chemical wastes will be accumulated in separate containers to avoid incompatible chemical reactions. 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. Liquids must be stored in screw-capped bottles or safety cans. Containers should be no more than 2/3 full. Broken glass is to be placed into broken glass boxes.

Waste will be segregated into aqueous and organic waste streams. In general, segregation of waste at the source will make the ultimate disposal task easier and much less expensive. 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.

Hazardous waste manifests are to be prepared whenever the wastes are removed from the laboratory that identify the chemical composition of the waste. This manifest should be signed by the laboratory supervisor before the waste is removed from the laboratory. Do not store more than 8 liters of waste within the laboratory.

In the event of an accidental discharge of prohibited substances into the sanitary sewer the procedure outlined in the Sanitary Sewer Use Ordinance for the City of Washington will be followed. On an annual basis, the Laboratory Section will evaluate the hazardous waste reduction program as per the Hazardous Solid Waste Amendments to the Resource Conservation and Recovery Act.

Biological Waste Management

Once used to culture bacteria, Petri dishes and tubes are to be placed in an autoclavable biohazard bag and sterilized prior to disposal. Storage areas for biological contamination are to be clearly marked and labeled as areas with potential biological contamination. Storage of biological contaminants must be labeled properly with the label indicating the potential for biological contamination.

Fume Hood Airflow Map

Fume hood location and number_____

Velocity at maximum height of _____Inches

Velocity at minimum height of _____Inches

Date_____By_____