Laboratory Safety Manual	Effective Date: November 6, 2015
	Page 1 of 9
Procedure No.: 100-120	Revision No. 2

NAME: _____

Laboratory Safety Manual

Before access to the laboratory is granted individuals must compete comprehensive safety training specified by the Laboratory Safety Officer.

GENERAL SAFETY PRACTICES

The following safety information is provided for employees and students using the Water Center Laboratory. Knowledge of basic safety practices is required before laboratory work can be performed.

Your signature at the end of this document indicates that you have read and understood, and that you will follow these procedures.

NO SMOKING, FOOD, OR DRINK IS ALLOWED IN THE LABORATORY.

Know what safety equipment is necessary for your work.

Eye and Face Protection

The hazards of each laboratory operation must be identified and the approved eyewear worn. Eye protection meeting ANSI Standard Z87.1, as summarized in Table 4-1 below, is the minimum level of eye protection required.

Table 4-1 - Summary of ANSI Z87.1-98
Approved Protective Eyewear

HAZARDS	APPROVED EYEWEAR
IMPACT: flying objects, fragments, particles	1,2,3,4,5,6
HEAT: hot sparks	1,2,3.4,5,6
HEAT: high temperature	1,2,3,5,6
CHEMICAL: splash	3,4, or 5(with 3 or 4)
CHEMICAL: irritating mists	4
DUSTS: airborne particles	3,4,6
IR/UV RADIATION: welding, soldering, brazing, cutting	Refer to ANSI Z87.1-89
1. Safety spectacles, with side shields **2. Goggles, flexible fit, regular ventilation** **3. Goggles, flexible fit, hooded ventilation**	4. Goggles, rigid body, cushioned fit 5. Face shield, plastic window 6. Chipping goggles, eyecup type

Wearing contact lenses is highly discouraged when working with or near chemicals, particularly solvents.

Operations Requiring Chemical Splash Goggles

To protect students, faculty, staff, and visitors from chemical eye hazards, the following operations require chemical splash goggles. When these operations are conducted in a fume hood with the sash lowered, safety glasses are acceptable.

1. Use of strong acids or bases (outside pH range of 2 - 10).
2. Use of corrosive gases.
3. Use of potentially explosive or water reactive chemicals.
4. Use of acutely toxic chemicals in liquid or powder form.
5. Use of cryogenic liquids where there is a risk or pressure buildup, splash, or particle hazard.
6. Use of other hazardous chemicals in liquid form.
7. Any activity where there is an explosion or implosion hazard.

Goggles must be worn by the person whose activity causes the hazard and by adjacent individuals. Faculty, staff, teaching assistants, and visitors working with students who are required to wear splash goggles must also wear splash goggles. Faculty are responsible for identifying any additional operations in their laboratories which pose a splash hazard and therefore require splash goggles.

Contact the laboratory manager or his/her representative to obtain chemical splash goggles. These goggles meet the American National Standards Institute Z87.1 standards (1998). Face shields are also available for additional protection, however, chemical splash goggles must be worn under the face shields.

4.8.1.2 Operations Requiring Safety Glasses or Splash Goggles

The following operations require the use of safety glasses or splash goggles.

1. Operations using or generating liquid or fine particulate chemicals for which splash goggles are not required.
2. Chipping, cutting, and grinding activities.
3. UV and/or IR protective safety glasses are required when working with instruments generating and releasing UV or IR emissions unless a safety mechanism automatically shuts of the emission source when exposure is possible. Refer to ANSI Z87.1-89.
4. When installing or removing regulators on gas cylinders.

Gloves

The need to wear gloves, and the selection of the appropriate gloves, depends on the hazard of the chemical, the potential for contamination during the experiment, and dexterity requirements.

Proper glove selection is a function of the specific chemical resistance of the material as measured by permeation rate and breakthrough time. **Disposable latex gloves have limited resistance to most commonly used laboratory hazardous chemicals. They should not be used without investigating their resistance to the chemicals being used, or in operations where contamination is anticipated.** When contaminated, they must be removed immediately and the hands washed. Use of latex gloves also poses a risk of serious allergic symptoms in sensitive individuals and of other individuals developing a latex allergy.

More resistant gloves include natural rubber, neoprene, nitrile, butyl, Viton, and polyvinyl chloride.

Recommendations of the glove manufacturer and the material safety data sheet for the particular hazardous chemical should be used in choosing the appropriate glove.

Clothing

The purpose of protective clothing is to prevent contamination of the skin and to prevent the carrying of contaminants outside the laboratory. Street clothes may afford limited skin protection but may result in contaminants being carried outside the laboratory. Bulky or dangling attire and easily combustible clothing should not be worn in the lab.

Protective Clothing: The use of a lab coat is strongly recommended in all laboratories. Lab coats must be worn in the laboratory when handling:

- Any quantity of select carcinogens or reproductive toxins that are absorbed through the skin
- Any quantity of acute toxins.
- Greater than 25 mL of strong acids or bases (outside pH range 2 - 10)

**IT IS THE RESPONSIBILITY OF THE DEPARTMENTS TO SUPPLY LAB COATS TO THEIR STUDENTS!!*

Additional specialized protective clothing should also be used in certain high-hazard operations, such as during the use of hydrofluoric acid. Again, it is the

responsibility of the faculty to choose the appropriate protective equipment for their staff and students.

Protective Footwear: ***Shoes must be worn at all times in the Water Center Laboratories**.* When working with hazardous chemicals or biological materials, or moving heavy objects, closed-toed shoes must be worn. Sandals or perforated shoes are NOT ACCEPTABLE, as feet are not protected from spills or falling objects.

CHEMICALS: A Material Safety Data Sheet (MSDS) is available for every chemical purchased by the Water Center. The MSDS contains complete safety information for problems related to health, fire, spill cleanup, reactivity hazards, and more. MSDS's are accessed through the internet via www.fishersci.com through the MSDS link. This website is continually updated and always available for anyone to read. Be familiar with every chemical you use, noting especially the hazards associated with it. Laboratory procedure 100-110 details access to Safety Data Sheets via the internet. Take special note of the following items regarding chemical use:

Acids: Always use gloves, lab coats, and goggles when handling concentrated acids. The acids are located in a fume hood in PH 428. They should be used in the hood; remove containers only when empty. Empty acid bottles should be rinsed with tap water three times and put with glass waste in room PH 428. When pouring an acid always add ACID TO WATER; never add water to a concentrated acid. Baking soda is available in every hood for neutralizing acid spills. When transporting an acid, always use a rubber bottle carrier instead of carrying the bottle by its neck.

Waste Disposal: Before disposing of wastes generated in an analysis, check with your supervisor. Many wastes are hazardous and have to be stored and disposed of by the campus Environmental Health & Safety office. If your work generates a hazardous waste, it is your responsibility to properly contain and label waste for disposal. Wastes that are to be stored for disposal must be labeled according to the following protocol:

Name: John Doe
Date: January 1, 2005
Solvent: Water (methanol, toluene, or NONE)
Contaminant: Mercuric chloride, 100 mg/L

Fumes: Fume hoods are located in every laboratory. They are to be used whenever you mix or heat chemicals that create hazardous or objectionable fumes. Never use a hot plate or heating mantle unless it is under a hood (the exception is heating growth media for microbiological tests or heating water to drive off carbon dioxide). Toxic fumes can be generated by the reaction of many chemicals. Strong reactions are listed on the MSDS for each chemical. Do not guess or presume you know. Read the MSDS for every chemical you use; and be aware of the hazards associated with each.

SAFETY EQUIPMENT: The attached map details safety features in the lab. It includes the location of fire extinguishers, showers, eyewash stations, first aid kits, fuse boxes, fire blankets and fire extinguishers (Note that fire extinguishers are located next to the EXIT of each room).

COMPRESSED GAS CYLINDERS: Gas cylinders can pose a serious health hazard. Never leave a gas cylinder on a cart or standing free. They are to be clamped to a cabinet or chained to a wall. Do not attempt to change or move a gas cylinder if you have not received instructions about the proper procedure or if you are not strong enough to maneuver the cylinder. Help is readily available for strenuous tasks such as these.

WORK SCHEDULES: The normal operating hours of the lab are 8:00 am to 4:30 pm, Monday through Friday. You will not be allowed to work weekends or after hours without the prior approval of lab personnel and your major professor.

BIOLOGICAL HAZARDS: Organisms grown in the microbiology lab may be pathogenic. Never disturb other projects, nor open an incubator unless you are using it, nor borrow equipment from the microbiology lab. Before beginning any biological work, speak with your supervisor regarding any/all safety needs and disinfecting techniques. A laminar flow hood is available in PH 419 for work involving hazardous organisms.

ACCIDENTS: ALL accidents, including those that do not involve personal injury or damage to equipment, should be reported to the lab manager or safety officer within 24 hours. Chemical spills and broken glassware should be cleaned up immediately and disposed of in designated containers in PH 428.

Fire: Quickly pull the fire alarm located in the hall by the staircase. Immediately call the Cookeville Fire Department (9 – 911). Following this, the Safety and Security Office should be called by dialing 3234. Immediate action should be taken to

evacuate the building. If the fire is in the same room as the phone, use another phone nearby. If you assess that an extinguisher could put out the fire, get the appropriate extinguisher (see locations on the map) and follow the instructions. Be familiar with each extinguisher in the laboratory. Different types of fires require different extinguishers. Each laboratory is equipped with the appropriate extinguisher for the fire most likely to occur in that area. Be familiar with the different types and their locations.

Spills: Take care of yourself first. If your clothes are contaminated, immediately proceed to the nearest safety shower. Pull the shower handle and hold it to release water. Warn others in the spill area and get assistance. Then, use spill control sorbent to contain the spill. Sorbent is located in PH 428. If necessary, use baking soda to neutralize acidic waste before disposing of the sorbent.

Broken glass: Broken glass is stored separately from other trash for the safety of our technicians and custodians. It should be swept up, not picked up by hand, and disposed of in broken-glass receptacles in the lab.

EMERGENCY PHONE NUMBERS

In case of an immediate emergency requiring professional assistance (medical/fire) call 9-911. Then call the University Police at ext.3234 and give them the nature of the call. (Only call from a SAFE location)

For after-hours maintenance problems, contact the University Police and they will forward your request to the appropriate person from Facilities.

If there is an emergency that is lab-related and does not require professional assistance, call the appropriate lab personnel listed below:

Dan Dodson	On-campus:	ext.3061
	After Hours:	(931) 349-2281 (home)
Michael Kuley	On-campus:	ext.3067
	After Hours:	(931) 319-4310 (cell)
Phillip Burr	On-campus:	ext.3608
	After Hours:	(931) 520-7146 (cell)

_____ _____

Laboratory Manager Date

Water Center - Environmental Quality Laboratory

Site Map