10.0 LABORATORY SAFETY RULES AND INFORMATION

Note: This section pertains primarily to safety in scientific laboratories that utilize hazardous materials and equipment. Information in this section supplements, but does not supersede, information given in NFPA code 45, Fire Protection in Laboratories Using Chemicals, available in the Facility management. This section also refers to OSHA 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories. For more information on this OSHA standard, consult: http://www.osha-slc.gov/OshStd_data/1910_1450.html

10.1 General Information

The university maintains and supports many teaching and research laboratories throughout the campus. These facilities are necessary to apply concepts that are learned in the classroom and to investigate areas of research by our faculty and staff. All scientific laboratories at the university are considered NFPA Class C or D laboratory facilities. This classification is based on the maximum amount of flammables that can be stored inside of a given laboratory. The following table further defines these facilities:

Maximum Quantity of Flammable and Combustible Liquids in Non-sprinklered* Laboratory Units, NFPA 45, Table 2.2.1(a)

Class	Flammable Liquid Class	Max. Quantity per 100 sq. ft. of Laboratory Space	Max. Quantity per Laboratory Unit
A	I	20 gallons	600 gallons
	I, II, and IIIA	40 gallons	800 gallons
B	I	10 gallons	300 gallons
	I, II, and IIIA	20 gallons	400 gallons
C	I	4 gallons	150 gallons
	I, II, and IIIA	8 gallons	200 gallons
D	I	2 gallons	75 gallons
	I, II, and IIIA	2 gallons	75 gallons

Notes: * Laboratories that exist in sprinklered rooms may store higher quantities. Contact the EH&S office for more information.

1. Storage Quantities include both those in storage cabinet and safety cans, and those not stored in storage cabinets and safety cans.
2. See EH&S Policy Glossary for flammables definitions.

10.2 Laboratory Use Safety Rules

Professors may use their own laboratory safety rules, provided they cover the topics listed below. In addition to the guidelines described in this section, employees and students who use university laboratories are also required to follow those set forth in sections 8 and 9 of the EH&S Policy wherever applicable.

- Supervisors and instructors are responsible for ensuring that employees and students are properly trained on how to use laboratory equipment safely.
- Employees and students should not operate laboratory equipment unless they are familiar with the hazards that exist in the use of this equipment.
- All persons who use laboratory equipment must wear proper personal protective equipment (PPE) when performing these tasks (see section 9.21).
- Sandals, open-toed shoes, and bare feet are prohibited in the laboratory.
- Do not smell or taste chemicals or mixtures of chemicals. Exception: In some laboratory exercises, it is acceptable to "whiff" the aroma of a chemical. Check specific procedures with the lab instructor or supervisor to be sure of this first before attempting to smell any chemical.
- First aid shall be available near the laboratory and all persons using the laboratory shall be familiar with its location and purpose.
- When working with hazardous materials or flammables, all persons should be familiar with any fire extinguishing devices that are available in the laboratory.
- The proper evacuation route is posted on the Emergency Information Floor Plan Maps for every building. If you cannot find this information, contact the EH&S office at 482-5357 or safetyman@louisiana.edu.
- The point of assembly after evacuation is also located on the Emergency Information Floor Plan Maps
- Persons working with hazardous materials should be familiar with the MSDS sheets and procedures associated with these materials (see section 10.22)
- All flammables and hazardous materials shall be properly contained and stored as per the guidelines in section 11.4.
- All hazardous waste should be transferred to its proper container. The University disposes of hazardous waste regularly – contact the EH&S Director at 482-5357 or safetyman@louisiana.edu for information on disposing hazardous waste.

10.3 Laboratory Inspections

Some of the most prevalent hazards associated with laboratory space are chemical spills and explosions. Inspections and preventative maintenance can greatly reduce these hazards.

Suggested Laboratory Inspections

Perform a daily check of the laboratory

- ✓ Chemicals and flammables must be properly contained (see section 11.4 for more information).
- ✓ Chemicals and flammables must be kept in a proper storage cabinet when not in use (see section 11.4).
- ✓ Check ovens, furnaces, fume hoods, and countertops for chemicals that may be reacting and left unattended.
- ✓ Check the floors and countertops for spills or leaks.
- ✓ Check for secured compressed gas cylinders, for bled regulators, and for closed main valves.

Perform a weekly check of the laboratory

- ✓ Inventory all Personal Protective Equipment (PPE) for adequacy and operation.
- ✓ Inspect dry chemical storage for proper containment. Ensure that containers are serviceable, and that lids are able to seal the chemical.
- ✓ Check natural gas and/or pneumatic flexible lines for cracks or leaks
- ✓ Operate all fume hoods and ensure that they are working properly. Pay attention to the sash, light fixture, gas and electricity services, and the exhausting ductwork.

Perform a monthly check of the laboratory

- ✓ Check all fire extinguishers for current inspection and proper charge
- ✓ Ensure that eyewash stations and showers are working properly. Change water in portable eyewash stations.
- ✓ Inspect and restock laboratory first aid kits
- ✓ Visually inspect laboratory glassware for traces of chemicals from a previous use.

Other things to do as needed

- ✓ Update MSDS sheets as necessary (see section 11.5)
- ✓ If the laboratory contains a telephone, make sure emergency phone numbers are posted on that phone.
- ✓ Ensure that the laboratory meets either Class C or Class D threshold storage quantity limits (see section 10.1 for more information).
- ✓ Handle and store hazardous waste according to the guidelines set forth in section 11 of this policy.
- ✓ Look at all chemicals for shelve-life expiration. Dispose properly if necessary.
- ✓ Check the drip edges on countertops and fume hoods for cracks, if applicable
- ✓ Make sure there are no more than 3-compressed gas cylinders containing flammable gases or oxygen per 500 sq. ft. of laboratory space.

- ✓ Make sure that all who occupy the laboratory understand the guidelines listed in this section (section 10).

Questions to answer when selecting areas for laboratories….
Building space is often converted to laboratory space. Where applicable, Facility management personnel shall provide assistance in assuring a safe and practical conversion. All applicable employees should look at the following questions particularly when converting existing building space to laboratory space.

- Are penetrations in the ceiling or walls of the laboratory sealed to prevent smoke or vapor from escaping to other rooms?
- Are floor openings sealed to prevent chemical spills from seeping to the rooms below you?
- Are there any explosion hazards that could potentially block a laboratory exit?
- If the laboratory is greater than 1000 sq. ft., is there more than one means of exit?
- If the laboratory contains a fume hood, is that hood located on a wall that is adjacent to the primary means of exit?
- Is the air conditioning system in the lab designed such that the return and exhaust air is kept in the lab and not shared with other rooms in the building?
- If the laboratory uses compressed gas cylinders, are those cylinders located such that they do not prevent occupants from exiting the laboratory in the event of an explosion or fire?
- Is there a portable fire extinguisher located within 25 feet of your laboratory? (see section 8.32)
- Is there a place designated to store laboratory PPE?
- Are all electrical outlets grounded? Is there ground fault circuit interrupters (GFCI) installed in areas susceptible to wetness?

10.4 Special Instructions for Laboratory Instructors
Students are especially exposed to hazards in the laboratory because of their inexperience. Safety training must be an essential part of any laboratory class. In doing this, faculty are setting a good example of safety awareness for students.

For each laboratory exercise, some time shall be devoted to informing students of the safety hazards associated with that particular exercise. Whenever possible, this

information should be given to the students in writing. A suggested way to do this would be to incorporate safety information into the lab manual or laboratory exercise procedures. Instructors are responsible for supervising students as they perform exercises. Whenever possible, instructors should assist students with techniques, housekeeping, and other issues as they pertain to safety. By doing this, students are assured of a learning experience that far exceeds any particular laboratory exercise. They develop a safety-oriented attitude that they can take with them into the workforce after graduation.

Things every laboratory student must know…

The following information must be provided to every laboratory student either in writing or verbally during the first regular laboratory class session:

- Instructors must identify the emergency floor plan (see section 1.4) for the building containing the laboratory.
- Students must understand where the laboratory exit(s) are and how to evacuate the building properly.
- Students must know where the nearest portable fire extinguishers are and how to use them. (see section 8.32)
- Students must understand how to use and must use any Personal Protective Equipment (PPE) necessary for safe laboratory exercises.
- Instructors are encouraged to impose some disciplinary action for students who knowingly or habitually do not use PPE.
- Students must know where the laboratory eye wash and/or shower station is located and how to operate these.
- Students must know where the laboratory first aid is.
- Students must know where the laboratory MSDS sheets are. Instructor should briefly tell students what MSDS sheets are and how to read them.

Chemical Spills in Laboratories

> *Note: For more information on chemical hygiene, consult section 11 of this policy. For more information on emergency preparedness, consult section 13 of this policy.*

- For minor chemical spills, clean up the area under the supervision of the laboratory instructor.

- For larger spills that are contained in one room, do the following:
    - ✓ Have all occupants evacuate the room immediately.
    - ✓ Two persons should grab fire extinguishers and be ready to extinguish any flame that forms from the spill into the hallway as they evacuate the room.
    - ✓ One other person shall dial 911 and stay on the telephone until emergency personnel respond.
    - ✓ Once called, University Police shall respond and decide if the fire department should be notified.
    - ✓ If called, the Lafayette Fire Department will respond with the proper HAZMAT vehicle.
    - ✓ Occupants may not re-enter the laboratory until emergency personnel deem it safe.

- For spills that have vapor, fumes, or smoke filling other rooms in the building:
    - ✓ Pull the fire alarm and instruct the building occupants to evacuate immediately.
    - ✓ Two persons should grab fire extinguishers and be ready to extinguish any flame that forms from the spill as the building is evacuated.
    - ✓ One other person shall dial 911 and stay on the telephone until emergency personnel respond.
    - ✓ Once called, University Police shall respond and decide if the fire department should be notified.
    - ✓ Occupants may not re-enter the building until emergency personnel deem it safe

Laboratory Equipment and Glassware

- Students and employees shall keep all work areas clean and uncluttered.
- All laboratory equipment shall be used only for its intended purpose.
- Glassware should be handled with care.
- When using glassware around temperature extremes, ensure that it is appropriate for such use.
- Broken, chipped, or cracked glassware is dangerous and shall be disposed of immediately.
- Glassware that is exposed to the hazards of explosion or implosion shall be shielded to contain chemicals and glass fragments.

Unattended Laboratory Operations

- Laboratory procedures that must be performed continuously or overnight shall be reviewed by a supervisor for safety before they begin.
- Appropriate warning signage indicating that any experiment is being conducted unattended shall be posted outside the laboratory entrances (Ex: Warning – Chemical Experiment Left Unattended Inside – Please Use Caution!)
- The overhead lights for the laboratory shall be left on.
- Make sure to check tubing, clamps, fasteners, and other equipment before starting the unattended operation.

Laboratory Fume Hoods

The University maintains a plethora of laboratory fume hoods and Biosafety cabinets. All of this equipment is checked annually by the EH&S Office in compliance with appropriate ASHRAE standards. Hoods are tagged accordingly (pass or fail). Hoods that fail the tests are repaired either in house or through a reputable contractor, and then re-tested before being placed back in service.

- Laboratories should utilize fume hoods for any chemical procedure that involves the release of hazardous vapors, fumes, or dust.
- Generally, substances used in fume hoods shall have a permissible exposure limit (PEL) of no more than 100 ppm.
- Start the fume hood and confirm its proper operation before opening or mixing chemicals. Air should be flowing into the hood from the laboratory.
- Keep the sash of the hood at or below the indicated maximum operating height. Keeping the sash lowered minimizes unexpected spillage and maximizes the exhaust airflow rate.
- Do not store chemicals or flammables inside the fume hood for prolonged periods of time.
- Do not use the hood as a means to dispose of volatile chemicals.

10.5 Radiation Safety Rules and Regulations

In certain areas, the university performs research oriented laboratory exercises that involves the use of radioactive materials. Because of the technical nature of the hazards associated with radiation, a UL Lafayette Radiation Safety Committee has been formed.

This safety committee meets at least once yearly to discuss specific issues as they relate to the use of radioactive materials. Included in the committee is a Radiation Safety Officer, who is responsible for receiving shipments of radioactive materials, regular inspection of facilities that utilize radioactive materials, management of radiation personnel training, and the custodial of records involving radiation.

Additionally, a *UL Lafayette Radiation Safety Manual* has been developed to provide guidance to employees and students who must work in this type of environment. This manual references many Louisiana Department of Environmental Quality regulations as part of its policies. A copy of this manual is located in the EH & S Office, and can be found at http://orsp.louisiana.edu/Committees/URSC.shtml

Any inquiries about radiation safety at UL Lafayette should contact the Louisiana Accelerator Laboratory Director at 482-6184 or the EH & S Office at 482-5357.