LSU Inter-Institutional Biological and Recombinant DNA Safety Committee (IBRDSC)

Policy: Maintenance of Laboratory Equipment

Adopted April 26, 2012

Properly functioning laboratory equipment is a critical component of good laboratory practice and safety. Each laboratory should have equipment management policies which include regular inspections and comprehensive equipment maintenance strategies. Many of the accidents that occur in the laboratory can be attributed to improper use or maintenance of laboratory equipment. (Autoclave use and validation is a separate policy.)

Equipment Examples: Microplate Reader, Microplate Washer, pH Meter, Balances, Water Bath, Water Distiller, Dilutor, Dispenser, Spectrophotometer, Autoclave, Drying Oven, Incubator, Microscope, Pipettes, Stirring Heating Plate, Refrigerators, Freezers, Chemistry Analyzers, Colorimeters, Biological Safety Cabinets, Chemical Fume Hoods, Centrifuges,

Biological Safety Cabinets

Biological safety cabinets must be certified at least annually (BSL-3 laboratories bi-annually) according to the National Sanitation Foundation Standard/American National Standard 49 (NSF/ANSI 49), which is the accepted standard for the biological safety cabinet industry. Testing must be performed to verify air flows, HEPA filter integrity, containment of contaminated cabinet air, and that the cabinet is safe to operate regarding other cabinet operational features. Whenever biological safety cabinets are moved, internal repairs are to be made, or when filters are to be replaced, the cabinet must be gaseous decontaminated. It also must be recertified before use. LSU requires that certification be done by third party firms and is the responsibility of the user.

Types of Biological Safety Cabinets

http://www.cdc.gov/biosafety/publications/bmbl5/BMBL5_appendixA.pdf

Class I: Protection for the operator, but no product protection. Air flow, at a minimum inward face velocity of 75 linear feet per minute (lfpm), directed through the front opening, across the work area and out through the HEPA filter on top.

This cabinet is used with a full width open front, or can be used with an attached armhole front panel with or without attached rubber gloves. These cabinets do not protect your materials from contaminants introduced from the environment or the operator.

Class II: Class II cabinets afford protection for the operator and the work performed. The capacity to protect materials within the cabinet is provided by the flow of HEPA-filtered air over the work surface. These cabinets can be used to manipulate low to moderate risk agents.

Class III: Class III Biological Safety Cabinets are totally enclosed and offer the highest degree of personnel and environmental protection from infectious aerosols, as well as protection of research materials from microbiological contaminants.

Other "Cabinets"

Clean Benches: Clean Benches direct HEPA-filtered air horizontally over the work area to protect research materials from contamination. Applications for clean benches include media plate preparation, electronics inspection, medical device assembly and pharmacy drug preparation. Since these cabinets do not provide protection to the user, they must not be used in with biohazardous material, hazardous chemicals, or radionuclides.

Cage Change Stations: Some rooms in animal housing facilities have cage change stations that are used for protecting the animals from pathogens and limiting exposure of personnel to allergens. They should not be used when working with hazardous chemicals or infectious biological agents.

Ultraviolet Lights in Biological Safety Cabinets

Ultraviolet lights are a common in many Biological Safety Cabinets. These lights are intended as biocidal devices. Unfortunately, the actual effectiveness of UV light in providing this "sterile" environment is doubtful. Also, there are potential occupational hazards that carry significant risks (e.g., serious eye and skin injury) with the use of these lamps. Ultraviolet lamps must be periodically tested to ensure that the energy output is adequate to kill microorganisms. The

radiation output should be at least 40 microwatts/ cm2 at 254 nm when measured.

The CDC, NIH, National Sanitation Foundation and the American Biological Safety Association all state that UV lamps are neither required nor recommended for use in a biological safety cabinet. ***Therefore, the LSU Office of Environmental Health and Safety does not recommend the installation of these lights or their use.***

http://www.ehs.umass.edu/ABSA%20UV%20light%20paper.pdf

Gas Flames in Biological Safety Cabinets
The LSU Office of Environmental Health and Safety prohibits the use of gas and flames in a biological safety cabinet.

http://www.bakerco.com/lib/pdf/bulletins/UseOfFlames.pdf

Chemical Fume Hoods

Louisiana State University has approximately 800 chemical fume hoods located on the main campus and various auxiliary sites.

Fume hoods are critical to the safety of researchers, faculty, and students, as they provide the primary means of preventing exposure to airborne hazardous materials on campus. Therefore, it is extremely important that the hoods be maintained in good working order.

All laboratory fume hoods are inspected annually by the Office of Environmental Health and Safety (EHS) according to requirements of National Fire Protection Association (NFPA) "45 Standard on Fire Protection for Laboratories Using Chemicals"; and University Policy Statement 19. The Louisiana State Fire Marshall's office also routinely inspects laboratory hoods to insure that annual inspection requirements have been met.

Hoods failing to meet EHS guidelines are posted with warning signs to limit or prohibit usage until repaired. Work requests are submitted to Facility Services to repair fume hood deficiencies. When the repairs are complete, EHS re-inspects the hood to insure that all requirements are met.

Contact Phillip Bellan | LSU Office of Environmental Health & Safety | 225-578-4743 | pbellan1@lsu.edu

Centrifuges
Operational guidelines

1. The work surface must be level and firm. Do not use the centrifuge on an uneven or slanted work surface.

2. Balance the tubes in the rotor. If you want to run a tube with 10 mL of liquid, put another tube with 10 mL of water in the opposing hole on the rotor. If the liquid has a higher or lower density than water, you must balance the tubes by mass, not volume.

3. Do not open the lid while the rotor is moving.

4. Wear a face shield and / or safety goggles if you have to work anywhere near a centrifuge that's in use.

5. Do not bump, jar, or move the centrifuge while the rotor is spinning. Make sure you don't have the cord dangling from a table edge where someone could catch their foot in it and pull down the centrifuge.

6. Examine tubes and bottles for cracks or stress marks before using them. Discard any centrifuge tubes that have cracks in them.

7. When working with biohazardous materials, wipe outside of tubes with disinfectant prior to removal from the biological safety cabinet and before placing in safety cups or rotors.

8. Place all tubes in safety buckets or sealed rotors when centrifuging infectious materials. Inspect the "O" ring seal of the safety bucket and the inside of safety buckets or rotors.

9. Open safety buckets or rotors in a biological safety cabinet. If any spills or leakage are apparent in the centrifuge rotor should be cleaned with a mild detergent, rinsed thoroughly with distilled water, and allowed to air dry completely (while in biosafety cabinet).

10. Clean the rotor and centrifuge well after each use.

Beckman Coulter Centrifugation Laboratory Resources:

http://www.beckman.com/resourcecenter/labresources/resource_centrif.asp
Sorvall Centrifuge Information: http://www.kendro.com
AIHA Laboratory Health and Safety Committee Centrifuge information:
http://www2.umdnj.edu/eohssweb/aiha/accidents/explosion.htm#Centrifuge
http://www2.umdnj.edu/eohssweb/aiha/technical/labequipment.htm#Centrifuges

Maintenance Manual for Laboratory Equipment. 2nd Edition. 2008. World Health Organization ISBN 978 92 4 159635 0
http://www.who.int/diagnostics_laboratory/documents/guidance/guidance2/en/index.html