ENVIRONMENT, HEALTH, & SAFETY

Laboratory Standard Operating Procedure for:

Biosafety Cabinets

Description

This standard operating procedure outlines the use of biosafety cabinets. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate administrative controls and personal protective equipment using biosafety cabinets.

Biological Safety Cabinets, (BSCs), also known as tissue culture hoods, are designed to provide personnel, environmental and product protection when appropriate practices and procedures are followed. Class II BSCs rely on directional movement of air to provide containment. Airflow is drawn into the front grille of the cabinet, providing personnel protection. The most commonly used BSC is a Class II A2. This type of cabinet is **not suitable** for volatile solvents.

BSC installation, required annual certification, decontamination and maintenance **must** be done by certified (accredited by the National Sanitation Foundation) professionals or by a certified OSEH technician. Maintenance and certification is the responsibility of the Principal Investigator (PI) and is to be coordinated through Environment, Health and Safety (EHS) at (810) 766-6763. Annual certification appointments require 2 – 4 weeks to schedule and will be done in accordance with OSEH Engineering Controls Standard of Care #1-6.

Work Practice Controls

Personal Protective Equipment:

- Appropriate personal protective equipment (PPE) must be worn. Lab coats must be buttoned. Gloves should be pulled over the wrists of lab coat, not worn inside coat. Additional PPE to be used as recommended.

Preparing BSC for work:

- Confirm BSC annual (within 12 months) certification is current; information found on sticker on front of BSC.
- Operate cabinet blowers at least 3-5 minutes before beginning work to allow the BSC to "purge" particulates.
- Use 70% ethanol to clean work surface of BSC and to disinfect any glass, etc. that is being used; amount of alcohol in BSC must be for only one day's work.

Working in the BSC:

- When working in the cabinet, move arms in and out slowly, perpendicular to the face opening to reduce disruption of air curtain.
- Perform all operations at least 4 inches from the front grille on the work surface.
- For BSC clean-up, apply 70% ethanol using wipes vs. spray bottles to minimize solvent vapor concentrations being re-circulated in the hood. Cabinet sash to remain open to allow for alcohol evaporation; sash can be lowered after sufficient time. The recommended minimum time for sash opening is 10 minutes.
- Do not bring potentially contaminated materials out of the cabinet until they have been surface decontaminated.
- Disposable underpads can be placed on the work surface but must not cover the front or rear grille openings. The use of toweling facilitates routine cleanup and reduces splatter and aerosol generation during an overt spill.
- Place all material as far back in the cabinet as practical, toward the rear edge of the work surface and away from the front grille of the cabinet.
- Place aerosol-generating equipment (e.g. vortex mixers, tabletop centrifuges) toward the rear of the cabinet.
- The workflow should be from "clean to dirty". Materials and supplies should be placed in the cabinet in such a way as to limit the movement of "dirty" items over "clean" ones.

Open Flames in a BSC:

- **Open flames in BSC are <u>not to be used</u>.**
- If a researcher requests to use open flames, EHS personnel will meet with the researcher and discuss issues and solutions.
- If it is deemed absolutely necessary for the work being done, use a pilotless burner or safety touch-plate micro burners to provide a flame on demand. Refer to OSEH Advisory Use of Bunsen Burners in Biological Safety Cabinets for guidance.
- The University of Michigan has taken a strong stance **against the use** of gas burners or alcohol flames in BSC. This decision has been made in accordance with recommendations from numerous agencies. The Centers for Disease Control and Prevention (CDC) reports that "open-flames are not required in the near microbe-free environment of a biological safety cabinet" and create "turbulence which disrupts the pattern of air supplied to the work surface," jeopardizing the sterility of the work area. This is also the recommendation of the World Health Organization (WHO) as well as the major BSC manufacturers.
- Early microbiologists had to rely on open flames to ensure sterility. With the advancement of modern technology, including the introduction of the BSC, the use of an open flame is no longer necessary.

UV Lights in a BSC:

The Center for Disease Control (CDC) and the National Institutes of Health (NIH) agree that UV lamps are not recommended nor required in BSC. UV lamps must be turned off when the room is occupied to protect eyes and skin from UV exposure, which can burn the cornea and cause skin cancer. Proper use and cleaning of BSC negates any need for the use of UV lamps. Numerous factors affect the activity of the germicidal effect of UV light, which require regular cleaning, maintenance and monitoring to ensure germicidal activity.

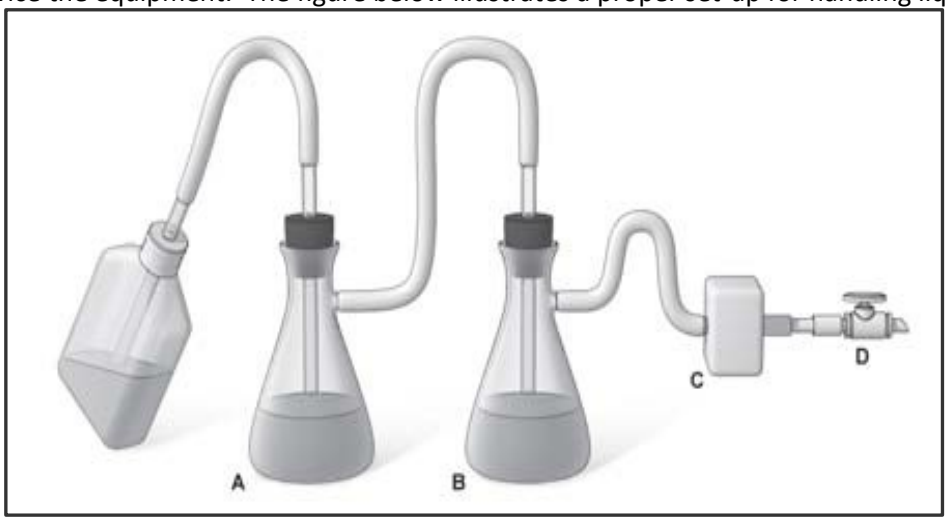
Protective Equipment

Appropriate personal protective equipment (PPE) must be worn. Lab coats must be buttoned. Gloves should be pulled over the wrists of lab coat, not worn inside coat. Additional PPE to be used as recommended.

Note: Respirators are masks designed to protect the wearer from specific airborne hazards and are different from surgical masks, which protect the wearer only from splashes and are primarily intended to protect others from infectious aerosols exhaled by the wearer. Respirator use requires employee participation in the Respiratory Protection Program, which involves medical clearance and annual fit testing and training. <u>Please be clear about use of surgical masks versus respirators.</u> (Do NOT use the vague term "masks").

Waste Disposal

A vacuum flask system is required to provide protection to the central building vacuum system or vacuum pump and to personnel who service the equipment. The figure below illustrates a proper set-up for handling liquid waste.



The left suction flask (A) is used to collect the contaminated fluids into a suitable decontamination solution; the right flask (B) serves as a fluid overflow collection vessel. An in-line HEPA filter (C) is used to protect the vacuum system (D) from microorganisms.

- Connect the primary flask to an overflow collection flask and to an in-line HEPA filter.
- Both flasks shall contain an appropriate disinfectant for the material used.
- The vacuum flasks may be set up within the cabinet; however, to save room, the system can be placed on the floor beneath or next to the BSC, using a secondary container to contain the flasks and a longer hose connection to the vacuum system.
- Once inactivation occurs, liquid materials can be disposed of as noninfectious waste in the sink. Empty the waste from the flask when it reaches no higher than ¾ full. Replace the flask with fresh disinfectant.

Questions regarding waste pick up should be directed to EHS at (810) 766-6763. This office can also assist you in minimizing waste generation, providing waste containers, labels, and manifests. Also refer to UM-Flint Hazardous Waste Management Program and EHS webpage http://www.umflint.edu/whs/environment-health-and-safety for more information.

Exposures/Unintended Contact

If the employee is in need of emergency medical attention, call 911 immediately.

Contact EHS for advice on symptoms of chemical exposure, or assistance in performing an exposure assessment.

Report all work related accidents, injuries, illnesses or exposures to UM-Flint DPS. Additionally, employees and supervisors must be sure to report the injury to EHS and complete and submit the Illness and Injury Report Form to WorkConnections within 24 hours. Follow the directions on the WorkConnections website Forms Instructions to obtain proper medical treatment and follow-up.

If you were involved in or observed an incident or near miss, please complete the EHS Laboratory Incident and Near-Miss Report Form. This will be valuable in improving laboratory safety on UM-Flint campus.

TREATMENT FACILITIES:

MAJOR INJURIES	MINOR INJURIES –During Business Hours	MINOR INJURIES –After Business Hours
Genesys Hospital One Genesys Parkway Grand Blanc, MI 48439 (810) 606-5710 **Hurley Medical Center** One Hurley Plaza Flint, MI 48503 (810) 262-9000 **McLaren Hospital Flint** 401 South Ballenger Hwy Flint, MI 48532 (810) 342-2000	**Genesys Occupational Health Network** 1460 Center Rd. Burton, MI 48509 (810) 715-4620 Mon. to Fri. 7:30 am to 10 pm Sat. & Sun. Noon to 8 pm **McLaren Flint-Burton OCC Center** 1459 S. Center Rd. Burton, MI 48509 (810) 496-0900 Mon. - Fri. 8 am to 8 pm Sat & Sun 10 am to 2 pm	**Downtown Flint** 420 S. Saginaw St. Flint, MI 48502 (810) 762-1550 **Genesys East** 1096 S. Belsay Rd, Suite F Burton, MI 48509 (810) 743-3351 **Genesys North** 4154 W. Vienna Rd Clio, MI 48420 (810) 686-7397 **Genesys South** 8447 N. Holly Rd Grand Blanc, MI 48439 (810) 603-0856 Mon. - Fri. 6 to 10pm / Sat. & Sun. 1-10pm

Click here for more information on the UM – Flint Emergency Preparedness and Response Plan.

Spill Procedure

- When a spill occurs, ***personal safety should always come first***.
- Alert and clear everyone in the immediate area where the spill occurred.

A **minor (small) biological spill** is one of a known chemical that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel, i.e., low concentration of infectious material that has high infectious dose small volume less than 1 Liter. A **major/large biological spill,** i.e., high concentration of infectious material that has low infectious dose, regardless of volume outside of BSC --may require active assistance from emergency personnel if volume is significant.

Spill Response Steps:

MINOR or MAJOR BIOLOCIAL SPILL in BSC

- BSC must be operating to provide user protection.
- Alert people in immediate area of spill.
- Wear protective equipment, including safety goggles, gloves and long-sleeve lab coat.
- Decontaminate all surfaces and items before removing from BSC.
- Cover spill with paper towel then saturate covered spill with disinfectant.
- Allow disinfectant 20 minutes of contact time before wiping up spill.
- Use tongs/forceps to pick up paper towel for disposal.
- Clean spill area with fresh towels soaked in disinfectant.
- Collect all waste materials in autoclave bag and autoclave using appropriate procedures.

- Clean spill area with water or 70% ethanol to preserve integrity of BSC.
- Allow cabinet to run an additional 10 minutes before resuming work or shutting down.

MAJOR BIOLOGICAL SPILL outside BSC

- Attend to injured or contaminated persons and remove them from exposure.
- Alert people in the laboratory to evacuate.
- Close doors to affected area.
- Post warnings to keep people from entering the area.
- Have person available that has knowledge of agents in use, incident, and laboratory to assist emergency personnel if assistance is requested.
- Wear PPE (gloves, lab coat, eye and respiratory protection)
- Cover spill with paper towel and saturate spill with disinfectant
- Allow disinfectant 20 minutes of contact time before wiping up spill.
- Use tongs/forceps to pick up paper towel for disposal.
- Clean spill area with fresh towels soaked in disinfectant.
- Collect all waste materials in autoclave bag and autoclave using appropriate procedures.

Additional Spill Links:

- www.oseh.umich.edu/pdf/chemspil.pdf
- http://www.oseh.umich.edu/emer-chemical.shtml.

Report all emergencies, suspicious activity, injuries, spills, and fires to the UM-Flint Department of Public Safety (DPS) at 911 from any university telephone or (810) 762-3333 from cell phone or non-university telephone. Register with the University of Michigan-Flint Emergency Alert System via Wolverine Access. Also, preprogram the UM-Flint DPS telephone number (810) 762-3333 into your cell phone for quick, easy use.

Training of personnel

All personnel are required to complete Laboratory Safety Training. Documentation of the training is required. This training can be accomplished by completing the ***Comprehensive Laboratory Safety*** session (**BLS009** *or equivalent*) via MyLINC, or UM-Flint EHS on-line training or other equivalent approved by EHS. Furthermore, all personnel shall read and fully adhere to this SOP when working within a BSC.

Certification

I have read and understand the above SOP. I agree to contact my Supervisor or Lab Manager if I plan to modify this procedure.

Name	Signature	UM ID #	Date

Prior Approval required – Is this procedure hazardous enough to warrant prior approval from the Principal Investigator? ☐ **YES** ☐ **NO**

Principal Investigator _____ **Revision Date** _____