

## Biological Safety Cabinets

### Standard Operating Procedure

Revision Date: 03/04/19

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*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.*

#### **Description** [Provide additional information as it pertains to your research protocol]

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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 BSC, providing personnel protection. The most commonly used BSC is a Class II A2. This type of BSC 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 Environmental, Health & Safety (EHS) technician. Maintenance and certification will be done in accordance with EHS [Engineering Controls Standard of Care #1-7](#).

#### **Process** [Write the steps to the process that uses the BSC]

#### **Potential Hazards** [Provide additional information as it pertains to your research protocol]

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#### **Engineering Controls** [Provide additional information as it pertains to your research protocol]

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Engineering control measures includes room design, ventilation systems, and lab and emergency response equipment.

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## Work Practice Controls [Provide additional information as it pertains to your research protocol]

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### *Preparing BSC for Work*

- Confirm BSC annual (within 12 months) certification is current; information found on sticker on front of BSC.
- Operate the BSC blowers for at least 3-5 minutes before beginning work to allow the BSC to “purge” particulates.
- Disinfect all interior surfaces of BSC work area with an appropriate surface disinfectant (i.e. 10% bleach followed by 70% ethanol).

### *Working in the BSC*

- When working in the BSC, 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.
- Do not bring potentially contaminated materials out of the BSC 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 BSC as practical, toward the rear edge of the work surface and away from the front grille of the BSC.
- Place aerosol-generating equipment (e.g. vortex mixers, tabletop centrifuges) toward the rear of the BSC.
- Do not place any objects such as papers, notebooks, etc. on the front grille.
- Loose or light weight-items (i.e pipette sleeve, paper towel, Kimwipes) should not be left inside the BSC at any time to reduce the potential of being drawn into the containment/motor area of the BSC.
- The workflow should be from “clean to dirty”. Materials and supplies should be placed in the BSC in such a way as to limit the movement of “dirty” items over “clean” ones.
- When finishing working in the BSC apply appropriate disinfectant. When using alcohol, the BSC sash is to remain open to allow for alcohol evaporation; sash can be lowered after sufficient time. The recommended minimum time for sash to remain open is 10 minutes.

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## **Open Flames in a BSC** [Provide additional information as it pertains to your research protocol]

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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.

- Open flames in BSC are not to be used.
- 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 microburners to provide a flame on demand. Refer to [Evaluation of Use of Natural Gas and Bunsen Burners Inside Biological Safety Cabinets](#) for guidance.

## **UV Lamps in a BSC** [Provide additional information as it pertains to your research protocol]

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The-CDC and the National Institutes of Health (NIH) agree that Ultraviolet (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.

For UV lamp disposal. Contact Hazard Materials Management at (734) 763-4568.

## **Personal Protective Equipment** [Provide additional information as it pertains to your research protocol]

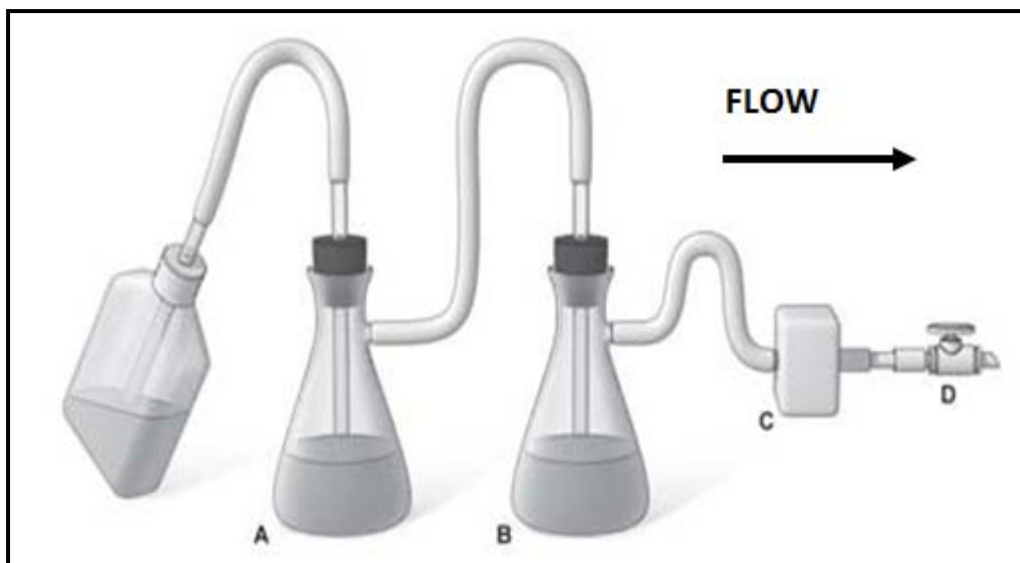
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Appropriate personal protective equipment (PPE) must be worn. Lab coats must be buttoned. Gloves should be pulled over the wrists of lab coat, not worn inside coat. Additional PPE to be used as recommended.

## **Waste Disposal** [Provide additional information as it pertains to your research protocol]

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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 BSC; 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 one of the following scenarios occurs:
  - Daily
  - Completion of process or experiment
  - When the it is  $\frac{3}{4}$  full

Questions about other waste generated from this, or other, processes should be directed to EHS Hazardous Materials Management (HMM) at (734) 763-4568. This office can also assist you in minimizing waste generation, providing waste containers, labels, and manifests.

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## Exposures/Unintended Contact

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*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 Work Connections within 24 hours by completing and submitting the [Illness and Injury Report Form](#). Follow the directions on the Work Connections website [Where to go for treatment](#) to obtain proper medical treatment and follow-up.

Complete the [Incident and Near-Miss Report](#) form.

### ***Treatment Facilities***

#### **U-M Occupational Health Services -- Campus Employees**

Mon-Fri 7:30 am - 4:30 pm

After hours - go to U-M Hospital Emergency Dept. -- Urgent Care Clinic

380 Med Inn building

1500 East Medical Center Drive, Ann Arbor (734) 764-8021

#### **University Health Services -- University students (non-life threatening conditions)**

Mon-Fri 8 am - 4:30 pm, Sat 9 am - 12 pm

Contact for current hours, as they may vary

207 Fletcher Street, Ann Arbor (734) 764 - 8320

#### **UMHS Emergency Department -- after clinic hours or on weekends**

1500 East Medical Center Drive, Ann Arbor (734) 936-6666

### **Spill Procedure [Provide additional information as it pertains to your research protocol]**

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

For additional information regarding spill response procedures, refer to the EHS [Hazardous Waste Spill Response](#) Web page.

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### ***Minor or Major Biological Spill in BSC***

A **minor (small) spill** is one that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel. In the event of a minor spill, use the following information for a safe cleanup process.

- 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 appropriate disinfectant (i.e. 10% bleach followed by 70% ethanol).

Allow BSC to run an additional 10 minutes before resuming work or shutting down.

A **major (large) spill** requires active assistance from emergency personnel. Do not attempt to clean up a hazardous substance or material spill that occurs outside a BSC. In the event of a major spill, contact the University of Michigan Division of Public Safety and Security (DPSS) by calling 911.

## **Emergency Reporting**

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Report all emergencies, suspicious activity, injuries, spills, and fires to DPSS by calling 911 or texting 377911. Register with the [University of Michigan Emergency Alert System](#) via Wolverine Access.

## **Training of Personnel**

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All personnel are required to complete the Biosafety and Bloodborne Pathogen Training session (BLS101 or equivalent) via the [EHS My LINC](#). 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 Lab Director if I plan to modify this procedure.

[illegible]

Laboratory Director

Revision Date

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**Major Revisions (Tracking purposes only -- Do not print as part of SOP)**

DATE	REVISION
09-19-18	EHS name and logo were added, updated the formatting, and revised the content under Exposure/Unintended Content (AKJ).
03-04-19	Reviewed and updated.

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