

## **1.0 TITLE**

Use and Maintenance of the Biological Safety Cabinet

## **2.0 PURPOSE**

Biological Safety cabinets (BSC) are ventilated enclosed cabinets designed to contain infectious aerosols and airborne particles generated during specimen manipulation. Biological Safety Cabinets (Class II) afford protection for experiments, personnel and environment. Contamination control in BSC depends on the proper mechanical performance of fans and the integrity of High Efficiency Particulate Air (HEPA) filters. HEPA filters remove particles 0.3µm or greater in size with an efficiency of 99.97%.

The correct use and maintenance of Biological Safety Cabinets is important for correct functioning. Cabinets must be regularly maintained, and records of vertical air pressure, servicing, and repairs kept. However, no cabinet can replace good aseptic and procedural control techniques for the prevention of laboratory acquired infections.

## **3.0 EQUIPMENT**

**3.1** Biological Safety Cabinet, Class II

## **4.0 SUPPLIES**

- 4.1** Absorbent towels
- 4.2** Mycobactericidal disinfectant
- 4.3** Freshly prepared 10 % bleach
- 4.4** Sterile water
- 4.5** 70% alcohol
- 4.6** Lab gown
- 4.7** N95 respirator
- 4.8** Gloves

## **5.0 SPECIAL SAFETY PRECAUTIONS**

- 5.1** All Biological Safety Cabinets in use in the laboratory are inspected, decontaminated, and certified annually by qualified service personnel.
- 5.2** Wear personal protective equipment when working inside the BSC.
  - 5.2.1** Wear a lab gown with elasticized cuffs and gloves pulled over the cuffs.
  - 5.2.2** Wear a N95 respirator when working inside the BSC.
- 5.3** Restrict activities around the BSC. Any activities that create air currents such as opening doors and windows, and personnel walking near the BSC can disrupt the air barrier at the opening to the BSC.
- 5.4** Ensure unimpeded air flow into the face of the BSC by having a clear space around the BSC.
  - 5.4.1** Any equipment that may hinder or disturb proper air movement (such as centrifuges, equipment with doors, rocker platforms, rotary shakers, vortex mixers or Sonicator) must NOT be located next to the BSC. Equipment such as refrigerators, freezers,

incubators (or other such equipment with doors) should be located as far from the front of a BSC as is possible and should not be opened / closed when someone is working inside the BSC.

- 5.5** Maintain a 12 – inch clearance behind and on each side of the BSC to allow access for maintenance and to ensure proper air movement.
- 5.6** Do not store items on top of or under a BSC. Items on top of a BSC can potentially interfere with the air movement across the exhaust HEPA filter housing, thus affecting cabinet inflow.
- 5.7** Do not tape biohazard waste bags to the front of a BSC. A waste bag for contaminated waste is kept inside the BSC.
- 5.8** Do not use an open flame within the BSC. An open flame in a BSC creates turbulence which disrupts the pattern of air supplied to the work surface and potentially compromises product protection. Use a Flame Boy or a Bacti-incinerator for heat.
- 5.9** Do not store equipment and supplies within a BSC. Place only those items to be used in the immediate procedure within a BSC.
- 5.10** Adjust the sash of the BSC to 8 – 10”. Maintain the prescribed sash opening. If the sash is too high, the user is not likely to contaminate themselves and their work. If the sash is too low, the unit is starved for airflow, creating the likelihood of product contamination. Never completely close the sash with the motor running. This may cause the motor to burn and will force room air to contaminate the work area. Cabinets with adjustable sashes have alarms to indicate an “out position” sash.
- 5.11** Do not turn off the fan in the BSC.
  - 5.11.1** Cabinet manufacturers recommend that the fan in the BSC remain on with the sash open. This does not harm the BSC.
  - 5.11.2** Let the BSC run for 15 minutes if it has been turned off. Make sure you have airflow (airflow indicator) and make sure the gauge reads above zero.
- 5.12** Keep UV lights clean. If you use UV light in conjunction with your BSC, make sure the UV bulb is clean and free of dust. Also remember, any equipment left in the cabinet will obscure the UV light from reaching areas of the BSC that are covered and block the germicidal effectiveness of the UV light. Routine disinfection of work surfaces is more critical in ensuring a “contaminant-free” area and can essentially eliminate the need for UV lights and thus eliminate the hazards involved with working with UV lights.
  - 5.12.1** Turn off UV light before starting work. If your BSC is equipped with a UV light, turn it off and turn on the fluorescent light before beginning work. It is important to avoid any hazardous exposure of the skin and eyes to UV light.

## **6.0 PROCEDURES**

### **6.1 Preparation of BSC for work**

- 6.1.1** Turn off the UV light and turn on the fluorescent light.
- 6.1.2** If the fan in the BSC has not been left running continuously, turn the blower ON. The yellow indicator light will light.
- 6.1.3** Check and record the airflow pressure in the Biological Safety Cabinet Maintenance Logbook after the fan has been running for ten minutes with no activity inside. It should be consistent with the last reading.
- 6.1.4** Spray or wipe all interior surfaces of the BSC with Mycobacterial disinfectant.
  - 6.1.4.1** If 10% bleach is used, after 15 minutes wipe down with **sterile** water as bleach will corrode metal surfaces and etch plastic view screen. Use sterile water to avoid the introduction of environmental Mycobacteria into the clean BSC.

**6.2** Place disinfectant soaked towels on the work surface of the BSC.

**6.3** Supplies and specimens are arranged in the cabinet's work area in logical order so that the clean and dirty materials are segregated on opposite sides of the work area.

**6.4** A disposal bag for solid waste and a container with disinfectant for liquid waste should be placed on the dirty side of the work area.

**6.5** Everything required for the procedure should be placed in the cabinet before beginning your work so that nothing passes in and out through the air barrier, until the procedure is completed.

**6.5.1** Use the checklist to ensure all supplies needed for the procedure are available.

**6.6** Do not block the front or the rear perforated grills.

**6.7** Check the sliding view screen so it is open no higher than the correct opening height of 8 – 10 inches.

**6.7.1** An alarm will sound if the opening is not at the correct height. This is important to maintain proper airflow.

**6.8** After the cabinet has run for at least three minutes with the window in the proper position, you are ready to begin work.

### **6.9 Working in the BSC**

**6.9.1** Work should be delayed for approximately one minute after bringing hands into the cabinet to allow the airflow to equilibrate.

**6.9.2** Only one person is allowed to work in the BSC at any given time.

**6.9.3** Perform all work in the central area of the cabinet over the disinfectant soaked paper towels. Reapply disinfectant to keep the towels moist.

- 6.9.3.1** Keep all materials at least 4 inches from the front opening. Do not work too close to the front of the cabinet. This can cause exposure of the operator as well as potential for contamination.
  - 6.9.3.2** Never place items (equipment, slides, supplies, paper, etc.) on the front or rear grills. Blocking of air vents and the front and the rear grills must be avoided any time.
- 6.9.4** Work with a limited number of slow arm movements. Move arms slowly when removing or placing new items into the BSC. Rapid arm and body movements can disrupt the airflow inside the cabinet. Minimize the number of times hands are placed outside the cabinet while working.
- 6.9.5** All items to be discarded are placed in a waste container inside the cabinet for removal after work is completed.
  - 6.9.5.1** Solid waste is placed in a disposal bag.
  - 6.9.5.2** Liquid waste is poured into a container that contains Mycobactericidal disinfectant.
    - 6.9.5.2.1** Read instructions for Mycobactericidal disinfectant. When container is two thirds full with liquid waste, the diluted disinfectant is at its optimum effective dilution.
- 6.9.6** Paperwork should never be placed inside the cabinet. Use a magnet to hold any necessary paperwork to the outside of the cabinet and on the side to avoid blocking the operator's view of the work area.
- 6.9.7** Bunsen burners must not be used inside the cabinet as the heat may disrupt the airflow and may damage the filters. Use other acceptable sources of heat, such as a Flame boy or a Bacti-incinerator.
- 6.9.8** Never operate the cabinet while the view screen alarm indicator is on. Adjust the height of your chair to keep the operating position of the view screen at the optimal height.
- 6.9.9** Use good microbiological techniques to avoid the generation of aerosols which will minimize the potential for personnel exposure to infectious materials inside the BSC.
- 6.9.10** Recap or cover opened tubes as soon as possible to reduce the chance for cross contamination.
- 6.9.11** See the spill procedure to clean any spillage of infectious material that occurs inside the BSC.

## **6.10 After working in the BSC**

- 6.10.1** After a procedure has been completed, all biological waste material must be placed in the disposable bag in the cabinet and all opened vials/ bottles/containers are closed.
- 6.10.2** Decontaminate and remove all equipment from the cabinet and any other items that may inhibit the cleaning of the entire work surface (e.g. plates, vortexes, etc).
- 6.10.3** Roll up the disinfectant soaked towels and place in solid waste disposal bag.
- 6.10.4** The liquid discard bins need not to be removed every day unless they are two thirds full, but the outer surfaces must be thoroughly disinfected.
- 6.10.5** Paper towel and gloves must be discarded in the disposal bag in the cabinet. The bag must be sealed while in the cabinet, the outside of the bag sprayed with disinfectant, removed from the BSC and discarded in the biohazard waste bin.
- 6.10.6** Decontaminate of the interior surface of the cabinet. Wipe down the interior walls with appropriate disinfectant. Flood and spread across the work surface the disinfectant then swab it up using absorbent paper towel.

## **7.0 DAILY MAINTENANCE OF THE BSC**

- 7.1.1.1** For each day of use:
  - 7.1.1.1.1** Visual air flow check performed and documented.
  - 7.1.1.1.2** Fan / gauge reading documented.
  - 7.1.1.1.3** Alarm check performed and documented.
  - 7.1.1.1.4** Decontamination of work surfaces at end of use performed and documented.
- 7.1.1.2** Daily maintenance of BSC documented on the BSC Daily Maintenance Log.
- 7.1.1.3** All failures of function checks are recorded on the Occurrence Management form and reported to the Supervisor.

## **8.0 CERTIFICATION**

- 8.1.1.1** All BSCs located in the laboratories must be checked for functionality and certified as safe to use :
  - 8.1.1.1.1** At installation
  - 8.1.1.1.2** If moved to another location within the laboratory
  - 8.1.1.1.3** At least annually

**8.1.1.2** The certification company provides service documentation for each BSC. All service records are kept on file.

**8.1.1.3** A label with the date certified and due date for check is placed on BSC in visible area.

## **9.0 REFERENCES**

**9.1** Miller, Michael. Guidelines to Placement and Use of the BSC. Centers for Disease Control and Prevention. 2003.

**9.2** World Health Organization. Laboratory Biosafety manual. Third edition. 2004. WHO/CDS/CSR/LYO2004.11

**9.3** The Baker Company Operator's Manual. Biological safety Cabinets. [www.bakerco.com](http://www.bakerco.com) Retrieved 12/24/2008

## **9.4**

## **10.0 RELATED DOCUMENTS**

**10.1 Occurrence Management Form**

## **11.0 APPENDICES**

**11.1 BSC daily maintenance log**

**11.2 BSC service maintenance logbook**