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Title: **Use of Biosafety Cabinets**	Approved by:
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1.0 PURPOSE & SCOPE

Primary containment equipment such as biosafety cabinets (BSC) are designed to reduce the risk of exposure to biological agents by isolating the activities from the laboratory environment. The BSC uses a combination of inward airflow and HEPA (high efficiency particulate air) filtration to protect the laboratory worker, the research materials and the laboratory. The purpose of this Standard Operating Procedures (SOP) is to describe the procedures for working safely in the BSC at *Laboratory ABC*.

2.0 REFERENCES

Laboratory ABC Biosafety Manual Section 3.2

Insert operational manual for specific BSC in use

3.0 RESPONSIBILITY

It is the responsibility of the Laboratory Supervisor to ensure all employees are trained in the safe use of the biosafety cabinet and emergency procedures in the event of BSC failure.

It is the responsibility of the Biosafety Officer to coordinate training for all new employees before they begin working in the laboratory with a BSC.

It is the responsibility of all employees to conduct aerosol generating procedures with infectious materials in the BSC in a safe manner.

4.0 TERMS and DEFINITIONS

"Class II A2 Biosafety Cabinet" means: a biosafety cabinet designed to provide product, personnel, and environmental protection through 30% exhausted and 70% recirculated airflow and are suitable for use with biological agents in the absence of volatile toxic chemicals.

"HEPA Filter" means: a filter that removes at least 99.97% of airborne particles 0.3*u*m in diameter. HEPA filters do not prevent gasses from passing through.

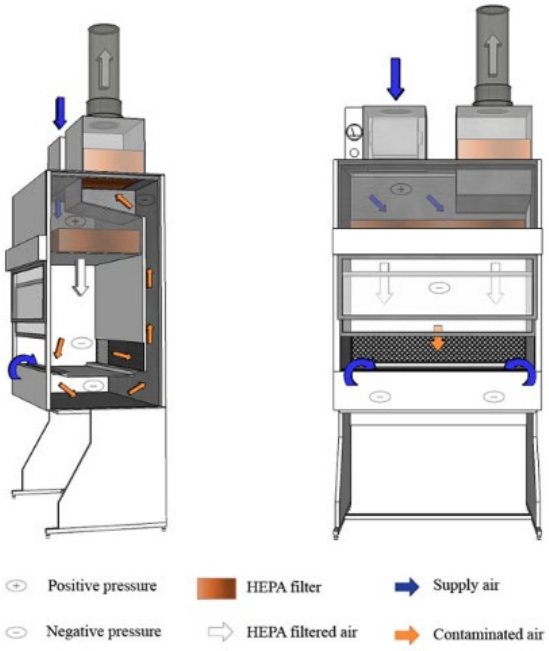
5.0 PROCEDURES

5.1 Introduction

Primary containment equipment such as biosafety cabinets (BSC) are designed to reduce the risk of exposure to infectious materials by isolating the activities from the laboratory room environment. A biosafety cabinet does not offer protection from potentially harmful chemicals, and its HEPA filter does not prevent gases and vapors from passing through. Not all BSCs are designed the same, although all protect the laboratory worker. Generally, a recirculating Class II Type A2 biosafety cabinet can be used for manipulating infectious materials in the absence of volatile toxic chemicals. All biosafety cabinets are certified annually and must be decontaminated appropriately prior to any maintenance work being carried out (i.e. use of liquid chemical disinfectants to wipe down surfaces of BSC). If maintenance work requires access to inner, potentially contaminated areas of the cabinet, gaseous decontamination may be performed by trained individuals only.

5.2 Design of the Biosafety cabinet

Laboratory ABC utilizes a recirculating Class II A2 biosafety cabinet that is certified annually to ensure ongoing performance. The following diagram illustrates the airflow patterns within this type of BSC. All employees must have an understanding of how the equipment functions to maintain primary containment.



5.3 Safe Use of the Biosafety cabinet

The following work practices will provide optimum containment and safety when working in the BSC:

- Only one person should be working in the BSC at a time; more than one person using the BSC can lead to disruption of the delicate air curtain at the front face of the cabinet.

- Check the magnehelic gauge before using the BSC to ensure it is working correctly. The gauge provides an approximate indication of HEPA filter loading. The BSC is also equipped with an alarm to indicate loss of airflow.
- Turn off the UV light if it is in use and turn on the fluorescent light. it is important to note that while exposure to UV will reduce the number of organisms in the air and exposed surfaces, the accumulation of dust will decrease its effectiveness due to poor penetrative power. The UV light must be regularly tested to ensure it is emitting the correct germicidal wavelength (approximately 26nm wavelength).
- Ensure that the sash is at the appropriate height; adjust stool height so that when working, your underarms will be level with the bottom of the sash and will not rest on the front air grille.
- The blower motor should be turned on at least 5 minutes before beginning work, and the work surface disinfected with 70% ethanol, ensuring at least 1 minute of contact time. Note that sodium hypochlorite can corrode stainless steel, and should only be used for spill-clean up followed by rinsing.
- Test the airflow alarm, and ensure it is switched to the "on" position. Confirm inward airflow by holding a tissue at the middle of the edge of the sash to ensure that it is drawn in.
- Gather all the necessary materials for the work and place them inside the cabinet. Avoid placing any non-essential items in the cabinet, being careful not to overload the cabinet or obstruct any of the air grilles. Use an absorbent pad to line the work surface, and place the materials well back from the front of the cabinet, working from clean to dirty.
- Don appropriate protective clothing, ensuring that gloves cover the cuffs of laboratory coat sleeves.
- When working in the cabinet, minimize the movement of arms in and out of the cabinet, If necessary, slowly move arms horizontally in and out instead of side-to-side motions and sweeping motions across the cabinet, which can disrupt the air curtain. Individuals walking quickly in front of the cabinet while someone else is working can also disrupt the air curtain.
- Work should be conducted at a moderate pace. Work towards the middle of the cabinet, away from the window. Place contaminated items towards the rear of the work area.
- An open flame should not be used inside the cabinet, as it presents a fire and explosion hazard, can burn the supply HEPA filter, and can generate convention currents that disrupt airflow. If necessary, discuss alternatives with the Biosafety Officer (e.g. use of micro-incinerators for loops, on-demand touch plate micro-burners).
- When work is completed, close containers and wait 5 minutes with no activity in the cabinet to purge contaminated air.
- Remove gloves (leaving them inside the cabinet) and wash hands thoroughly.
- All waste materials (including gloves) are to be discarded into biohazard waste receptacles inside the cabinet; don a new pair of clean gloves and surface-disinfect objects before removing them from the cabinet (this step is necessary as aerosols may have contaminated the surface of objects in the cabinet).
- Disinfect the interior surfaces of the cabinet with 70% ethanol, ensuring at least 1 minute contact time; turn off the cabinet blower.
- Once again, remove gloves and protective equipment; wash hands.

5.4 Emergency Procedures

Do not use the BSC if the alarm sounds when it is turned on or if there are other indications of malfunction. Call the Biosafety Officer for assistance.

If the alarm sounds when working in the BSC, or there are indications of malfunction such as no airflow, increased pressure on the gauge, or unusual noises:

- Immediately stop work, close tubes, and cover materials.
- Remove outer gloves, leaving them inside the cabinet.
- Don a new pair of outer clean gloves and gather waste materials (including gloves) into biohazard waste receptacles inside the cabinet. Surface-disinfect objects before removing them from the cabinet and disinfect the interior of the BSC surfaces.
- Switch off the power if the blower is making noise and post a sign on the equipment indicating it is broken and cannot be used.
- Call the Laboratory Supervisor or Biosafety Officer for assistance.

If a spill should occur inside the BSC while working with biological materials:

- Immediately stop work, close tubes, and cover materials.
- Leave the cabinet in operation.
- Alert other employees working in the laboratory.
- Remove potentially contaminated protective clothing (e.g. outer gloves, outer laboratory gown) and place in autoclave bags for decontamination; inner gloves, laboratory coat and respiratory protection (if worn), should remain on.
- Don new outer gloves and outer laboratory gown and assemble appropriate spill clean-up materials from the spill control kit (e.g. paper towels, autoclave bags, puncture resistant containers, forceps, disinfectant).
- Cover the spill with paper towels; soak the paper towel with a suitable disinfectant (e.g. 1:10 dilution of sodium hypochorite*), working from the outside in to avoid enlarging the spill area; gentle flooding will avoid creating aerosols.
- Allow sufficient contact time (e.g. 20 minutes*) for disinfection.
- If spilled material has gone through the perforated grills then pour disinfectant through grills into the catch tray underneath; let stand for the appropriate contact time (20 minutes*), drain the tray through drain cock and clean.
- Use forceps to pick up any broken glass or sharps and place in a puncture-resistant container.
- Using tongs, wipe up spill and place all materials in an autoclave bag inside the cabinet.
- After disinfection has been completed thoroughly rinse the surface with water to remove any remaining sodium hypochlorite which can corrode stainless steel.
- Items in the BSC at the time of the spill must be thoroughly disinfected with 70% ethanol prior to removal from the BSC and/or bagged for removal and autoclaved.
- Wipe the inside of the cabinet with 70% ethanol and allow BSC to run for 10 minutes prior to resuming work.
- Report the spill using the “Accident & Incident Reporting” form.
- Restock the contents of the spill control kit.

Notes:

* The use of a 1:10 dilution of sodium hypochlorite is generally effective against most classes of microorganisms. It should be noted however that the disinfectant selected is dependent on the type of microorganisms being manipulated in the BSC at the time of the spill. For spills involving high organic loads, a longer contact time (e.g. 30 minutes) may be required.