Standard Operating Procedure **Biological Safety Cabinet**			
SOP Number:	SOP-BSC-01	Category:	Lab Equipment
Supersedes:	N/A	Effective Date:	December 1, 2017
		Pages	7
Subject:	**Biological Safety Cabinet**		

Prepared By:	Lisa McAvoy	16/Nov/17 dd/mmm/yy
Approved By:	Veronica Harris-McAllister	17/Nov/17 dd/mmm/yy

1.0 POLICY

Biological safety cabinets (BSCs) are the primary means of containment for working with biohazardous materials. BSCs are designed to reduce the risk of infection by isolating the activities in the BSC from the laboratory environment. BSC also can be used to protect the biohazardous materials during manipulation. A Class II Type A2 BSC is located in the Research Centrifuge Room within the W.J. Henderson Centre for Patient-Oriented Research (WJHCPOR). The Kingston General Health Research Institute (KGHRI) will ensure that the BSC is inspected and certified annually.

2.0 PURPOSE

To ensure that all users of the WJHCPOR can safely operate the BSC to manipulate potentially infectious biospecimens and reduce the risk of infection.

3.0 DEFINITIONS

Class II Type A2 Biological Safety Cabinet (BSC): is the primary barrier protection for individuals working with low to moderate risk biohazardous materials designed to discharge HEPA-filtered exhaust air directly into the laboratory or into an exhaust system ducted out of the building with a thimble connection. When ducted out of the building, this BSC may be used for applications involving minute quantities of volatile toxic chemicals. During operation, room air is drawn into the inlet grill of the BSC. The air in the plenum beneath the work surface of the BSC is a mixture of unfiltered room air and air that has just passed through the work area of the BSC. This contaminated air is drawn by the blower through the back plenum of the BSC, where approximately 70% of the air is recirculated through the supply HEPA filter and back over the work area. The balance of the contaminated air is discharged to the environment after passing through the exhaust HEPA filter.

HEPA Filter: HEPA stands for High-Efficiency Particulate Air. HEPA filters are defined as air-cleaning devices that have a proven minimum removal efficiency of 99.97% of particles in the air, equal to 0.3 μ (microns) in diameter, with higher efficiency for both larger and smaller particle sizes.

4.0 PROCEDURES

Users are responsible for:

- Ensuring they receive orientation and training on the BSC by the designated KGHRI staff member before using the BSC on their own.
- Following the proper procedures for BSC use, including cleaning/disinfecting after each use of the BSC.
- Reporting immediately any damage or malfunction of the BSC to the designated KGHRI staff member. If after hours, users are required to complete a "BSC Damage Form" (found in the binder on the shelf above the centrifuges) and attach the FORM to the BSC. The FORM describes the problem, the date/time the problem occurred and includes the user's contact information (name, number, and email). The BSC **MUST** not be used until fixed.
- Reporting incidents (i.e. spills, accidents, exposure) immediately. See "Accidental Occupational Exposure and Reporting Workplace Incidents" SOP
- Be familiar with the material safety data sheet (MSDS) for the particular disinfectants, chemicals and biohazardous materials used in the BSC. The MDSC are located in the binder on the shelf above the centrifuges.

KGHRI is responsible for:

- Providing all users of the WJHCPOR with orientation and training on the proper use of the BSC in the Research Centrifuge Room within the WJHCPOR.
- Ensuring all users receive BSC safety training regarding laboratory work practices and BSC user guidelines prior to commencing work with the BSC.
- Ensuring that the BSC is tested and certified (NSF/ANSI 49 standard) after installation, after relocation, and at least annually by a qualified individual who will provide documentation indicating the date of certification. Queen's University and KGHRI currently use CON-TEST for BSC certification. BSC certification reports are filed by the designated KGHRI staff member in the binder on the shelf above the centrifuges and a copy of the certification report is attached directly to the BSC.

- Routinely monitor the Filter Gauge value of the BSC using a log (found in the binder on the shelf above the centrifuges. As the Filter Gauge approaches 20% remaining capacity, the cabinet filter should be replaced. The designated KGHRI staff member will call CON-TEST to arrange a service visit and place a “do not use” sign to notify users that no work is performed in a malfunctioning BSC.

- Conducting routine (weekly, monthly and annual) cleaning (full wipe-down) and maintenance as described in the Biosafety Cabinet User Manual.

- Coordinating maintenance, repair and new BSC equipment needs.

General Rules when using BSCs

Personal Protective Equipment (PPE)

- When working in a BSC, the user should wear:
    - closed-front over garment (e.g. long sleeve fully buttoned lab coat).
    - gloves (latex or vinyl gloves) Note: Gloves should overlap the cuffs to ensure that aerosols do not contaminate the hands, arms and surfaces.
    - long pants or skirt and full covering shoes (covering top of foot, toes and heel).
    - protective eyewear (goggles) and protective facemask (if appropriate).

Lighting

- There are two types of lighting inside the BSC: fluorescent and ultra-violet (UV). The fluorescent light should normally be ON while work is being done within the cabinet.

- Direct exposure to UV light (approximately 260 nm wavelength) can reduce the number of pathogenic microorganisms on exposed surfaces and in air. However, it is important to note that: (I) UV light has poor penetrating power; (2) the accumulation of dust, dirt, grease or clumps of microorganisms reduce its germicidal effects; (3) UV light is not effective against all organisms; and (4) exposure to UV light is hazardous (it may result in severe eye damage and bums to the skin).

- Routine use of UV lamps to decontaminate a BSC is not recommended. They are useful in certain situations, if properly maintained, such as when using spore-forming bacteria since bacterial spores are resistant to chemical disinfection. UV lamps must be turned off whenever the laboratory is occupied unless the sash can be lowered so that it is completely closed.

BSC Start-Up

- Turn **OFF** the UV lamp (if it is on).
- Slowly raise the sash until the bottom of the sash aligns with the sash indicator decal located on the left side of the work area. Raising the sash will automatically turn on the fluorescent light and blower.
- Ensure that nothing is blocking the front grilles. Note the filter gauge reading. If it is 20% or less contact designated the KGHRI staff immediately and **DO NOT USE** the BSC.
- Allow the BSC to operate unobstructed for 5 minutes. Ensure that the alarm has **NOT been turned OFF**, and that airflow is sufficient.
- Wash hands thoroughly and don PPE (lab coat, mask (if applicable), goggles and gloves).

Wipe-Down

- Slowly raise the sash until the bottom of the sash aligns with the sash indicator decal located on the left side of the work area.
- Mute the alarm by depressing the **Alarm Silence** switch.
- Wipe down the interior surfaces of the cabinet with Oxivir®, and allow time to dry.
- Close the sash back to its operating position which will reset and unmute the alarm.

Loading Materials

- Materials or equipment placed inside the BSC may cause disruption to the airflow, resulting in turbulence, possible cross-contamination, and/or breach of containment.
- Only load the materials required for the procedure. Do not overload the BSC.
- Do not obstruct the front, side, or rear return air grilles.
- Large objects should not be placed close together.
- Slowly close the sash until it is in the correct operating position.
- After loading the BSC wait 5 minutes to purge airborne contaminants from the work area.

Work Techniques

- Movement of arms in and out of the BSC can disrupt airflow, adversely affecting BSC performance. Whenever possible, place all materials needed for a procedure inside the BSC before starting. Move arms slowly and move straight out of the BSC. Do not sweep arms across the front of the BSC. Do not walk quickly in front of a cabinet when someone else is working in the BSC.

- Ensure that the BSC can provide proper product, personnel and environment protection. It is important that the front grilles are not blocked. Raise arms slightly to ensure that arms are not resting on the grille. Ensure other items are not blocking the grille (i.e. pipettes, etc.).

- Work towards the middle of the BSC, away from the sash. All operations should be performed at least four "4" inches from the front grille on the work surface.

- Segregate all clean and contaminated materials in the work area. Place contaminated material at the rear of the work area. Active work should flow from the clean to contaminated area across the work surface.

- Discard contaminated waste including contaminated gloves **INSIDE** the cabinet.

- The surfaces of all materials and containers placed into the BSC **MUST** be wiped with Oxivir® to reduce the introduction of contaminants to the BSC environment.

- Clean up spills as soon as they occur. If there is a spill or splatter during use, all objects in the cabinet should be surface decontaminated with Oxivir® before removal. Thoroughly disinfect the working area of the BSC **WHILE IT IS STILL IN OPERATION**, to prevent the release of contaminants from the BSC.

Spills

- Remove gloves and discard within the BSC. If two pairs are worn, discard the outermost layer. If sleeves are potentially contaminated, the laboratory coat or gown should also be removed and placed in the laundry bin behind the research centrifuge room door. Fresh gloves should be donned and if necessary, also a fresh laboratory coat or gown.

- Leave the BSC blower on and the sash at the appropriate level.

- Remove any debris using forceps, tweezers or tongs and place in the yellow Sharps waste bin/container inside BSC.

- Surface disinfect all objects within the BSC (e.g. pipettes, tube holders, etc.) using Oxivir® wipes before removing them from the BSC.

- If material has spilled through the grill/catch tray of the BSC, pour some disinfectant (Oxivir® solution) through the grill/catch tray to flood the catch tray underneath.

- Wipe all inside surfaces of BSC with disinfectant (Oxivir® wipes).

- Raise the work surface, clean the catch tray (you may need to soak up the Oxivir® solution in the catch tray with paper towels), and then replace the work surface.

- All used paper towels soaked in Oxivir® and/or Oxivir® wipes and contaminated gloves are to be discarded in the yellow biohazard waste bin/container.

- Allow BSC to run for at least 10 minutes before resuming work or shutting down.

Completion of work

- Close or cover open containers and leave the blower on for at least 5 minutes with no activity to purge the BSC.
- Surface disinfect objects with Oxivir® wipes before removal from the BSC. Remember that aerosols generated during operations in the BSC such as pipetting might have contaminated objects in the BSC, so there does not have to be a spill for this step to be necessary.
- Disinfect BSC surfaces with Oxivir® wipes. Periodically remove the work surface and disinfect the area beneath it (including grill/catch tray) and wipe the surface of the UV light with disinfectant.
- All used paper towels soaked in Oxivir® and/or Oxivir® wipes and contaminated gloves are to be discarded in the yellow biohazard waste bin/container.
- Allow BSC to run for at least 10 minutes before shutting down.
- Doff PPE (gloves, goggles, lab coat, mask (if applicable)) and wash hands thoroughly.
- If lab coat soiled, place in laundry bin behind door.

5.0 CONTACTS

Research Administration Facilitator (Designated KGHRI Staff Member):

Lisa McAvoy
Kingston General Health Research Institute
W.J. Henderson Centre for Patient Oriented Research
Connell 4, Kingston Health Science Centre (KGH Campus)
Kingston, Ontario K7L 2V7
613-549-6666 ext. 3344
mcavoye1@kgh.kari.net

Director, Health Sciences Research:

Veronica Harris-McAllister
Kingston General Health Research Institute
W.J. Henderson Centre for Patient Oriented Research
Connell 4, Kingston Health Science Centre (KGH Campus)
Kingston, Ontario K7L 2V7
613-549-6666 ext. 3653
harrismv@kgh.kari.net

6.0 SOP HISTORY

SOP Number	Date Issued	Summary of Revisions
SOP-BSC-01	01-DEC2017	Original version.