**Biological Safety Cabinet Training and Instructions for Use**

The purpose of this guideline is to detail the safe operation of biological safety cabinets. Failure to adhere to the following procedures will result in decreased protection while using the Biosafety Cabinet (BCS).

A Biological Safety Cabinet provides a safe laboratory workspace using optimum airflow design combined with an integrated HEPA filtration system. Room air is drawn in through the intake grille on the front of the unit, then under the work surface and directed to the top of the cabinet where it passes through a HEPA filter. Negative pressure is created inside the cabinet resulting in a primary containment work area while the HEPA filtration supplies clean air to the work surface in a vertical laminar flow pattern. These airflow patterns provide an optimum air curtain on the front opening, maintaining personnel and product protection. The exhaust HEPA filter traps biohazardous particles prior to the air being exhausted back into the laboratory, preserving environmental protection. The following are some tips for good technique that will maximize potential protections of personnel, sample and environment.

**Biosafety Cabinet Protocol:**

1. **Wear Appropriate Personal Protective Equipment**

Wear a mask, eye protection, lab coat, closed-toe shoes and disposable gloves to protect yourself as well as your samples from contamination. Lab coats must be buttoned and backclosing laboratory gowns tied, if utilized, for greater protection. Gloves should be pulled over the wrists of lab coats, not worn inside the sleeve.

1. **Prevent Air Flow Problems**

Never work in a biosafety cabinet if the Magnehelic gauge indicates a problem – call for service immediately. The Magnehelic gauge should read close to the setting at the last certification (currently 0.25). A reading that’s too high or low may indicate a problem with airflows, putting personnel or product at risk.

Ensure the fan in the Biosafety Cabinet is turned on and running. If it is not, turn on the fan and wait 15 minutes before beginning work to allow adequate air filtration.

1. **Use the Correct Sash Height**

Never work in a biosafety cabinet when the sash is not at the correct height. Proper sash level is necessary to ensure correct airflow during use.

1. **Keep Intake Air Grille Clear**

Covering the air grill at the front of the cabinet compromises airflow integrity. Blocking the grill can cause laboratory air to enter the work zone or even work zone air to enter the laboratory environment. But when untreated laboratory air is blocked from entering the front grille, it can flow over the work surface, contaminating the product and posing a risk to personnel. Never block the front air intake grille.

Do not rest arms on front grille because doing so allows room air to flow directly into the work area rather than being drawn through the front grille. Instead, work with both arms raised slightly.

1. **Minimize Movement**

The rapid movement of a worker’s arms in a sweeping motion into and out of the cabinet will disrupt the air curtain and may compromise the partial barrier containment provided by the Biological Safety Cabinet.

Moving arms in and out slowly, and keeping them perpendicular to the opening of the cabinet, will reduce this risk. Manipulation of materials inside the cabinet should be delayed for 1 minute after placing hands/arms inside the cabinet to allow the air to stabilize and to "air sweep" arms.

Other personnel activities in the room, such as rapid movement or opening and closing room doors, may also disrupt the cabinet air barrier.

1. **Reduce Splatter**

Many common procedures conducted in Biological Safety Cabinets can create splatter or aerosols. Good microbiological techniques should always be used when working in a Biological Safety Cabinet to minimize this potential.

Techniques to reduced splatter and aerosol generation will minimize the potential for personnel exposure to infectious materials manipulated within the cabinet.

Class II cabinets are designed so that horizontally nebulized spores will be captured by the downward flowing cabinet air within fourteen inches of travel. As a general rule of thumb, keeping clean materials at least twelve inches away from aerosol-generating activities will minimize the potential for cross-contamination.

1. **Know Your Work Area**

The middle third of the work surface is the ideal area to use. All operations should be performed at least four inches from the front grille on the work surface.

Materials or equipment place inside the cabinet may cause disruption to the airflow, resulting in turbulence, possible cross-contamination, or breach of containment.

1. **Work from Clean to Contaminated**

Active work should flow from the clean to contaminated area across the work surface. Materials and supplies should be placed in such a way as to limit the movement of dirty items over clean ones.

Maintain proper balance of materials from left to right in order to prevent an airflow imbalance within the work zone. Bulky items such as biohazard bags, discarded pipette trays, and suction collection flasks should be placed to one side of the interior cabinet. All materials should be placed 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. Similarly, aerosol-generating equipment such as vortex mixers and tabletop centrifuges should be placed toward the rear of the cabinet to take advantage of the air split.

1. **Working with Tubes**

Open tubes or bottles should **NOT** be held in a vertical position. Hold tubes at a 45 degree angle. Bottle or tube caps should not be placed on the toweling, and items should be recapped or covered as soon as possible.

1. **Disinfect Items Before Removing Them From the Cabinet**

Anything placed into a biosafety cabinet will become contaminated – clipboards, pens, pencils, etc. As a rule, allow only the items essential to your task to be placed inside the cabinet. If anything else makes its way inside, always disinfect such items before taking them out. SaniCloths, a 10% bleach solution, or 70% ethanol solution may be used.

1. **Dispose of Waste Properly**

To minimize frequent in/out arm movement and maintain the air barrier, dispose of waste using the biohazard container inside the Biosafety Cabinet.

Pipettes should be decontaminated within the cabinet. Other biohazard waste should be similarly bagged inside the cabinet to avoid spreading contamination. Removing disinfected waste from the cabinet frequently cuts down on clutter and keeps airflow moving the way it’s supposed to.

1. **Disinfect Work Area After Use**

Wipe down the Biosafety Cabinet with a SaniCloth after each use. At the beginning and end of each shift, clean the entire cabinet with a 10% bleach solution (prepared daily), followed by 70% ethanol.

1. **Keep the Top of the Biosafety Cabinet Clear**

Do not use the top of the cabinet for storage; this can damage the HEPA filter. Keep the top of the cabinet clear.

1. **Ban Open Flames**

Flammable gases are not captured by HEPA filters, so if a Bunsen burner or other open flame is used inside a biosafety cabinet, these gases may recirculate and build up, posing an explosion or fire risk. Additionally, the heat from an open flame can disrupt airflows that protect you and your research. Find a substitute for open flames.