

# *Environmental Health and Safety Update*

## Flammable Gases in Biological Safety Cabinets

### Overview

Certain biological safety cabinets (BSCs) recirculate air within the cabinet. Most BSCs at Weill Cornell Medical College are recirculating. The use of natural gas or other flammable gases within these BSCs may allow flammable gases to concentrate, potentially leading to an explosive atmosphere. The use of flammable gases within a BSC also may alter the airflow pattern used to protect products and personnel. This update outlines which BSCs recirculate air and the procedures to increase safety and prevent flammable gas explosions within BSCs.

### Applicability

All faculty, staff, students, and visitors working with natural gas or other flammable gases inside biological safety cabinets that recirculate air. Natural gas within a BSC is typically “house” gas connected directly to the BSC.

### Responsibilities

**Environmental Health and Safety (EHS)** is responsible for providing guidance and information regarding the safe use of flammable gases within BSCs in compliance with all relevant Federal, state, local, and institutional regulations.

**Principal Investigators and Laboratory Managers** establish procedures and policies in keeping with the information provided in this update for ensuring that all laboratory personnel are aware of, and in compliance with those policies and procedures.

#### **BSC Users**

Refrain from using natural gas and other flammable gases within recirculating BSCs.

**Facilities** Effective [date], will no longer provide house natural gas to biological safety cabinets for new projects and maintenance unless the BSC is verified to be a “total exhaust” cabinet by EHS. Natural gas lines to recirculating BSCs are to be turned off as they are discovered. When applicable, natural gas lines to BSCs will be physically disconnected and capped during laboratory renovation projects.

### Procedure

Certain types of BSCs are designed to contain, not exhaust, most of the air within a cabinet. This makes them prone to the buildup of materials within the cabinet. The following 4 types of cabinets are located at the Medical College:

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<u>BSC Type</u>	<u>Former Name(s)</u>	<u>% Recirculated Air</u>
Class II Type A1	Class II Type A	70
Class II Type A2	Class II Type A/B3	70
Class II Type B1	N/A	30
Class II Type B2	N/A	0

BSCs that recirculate air are commonly found at the Medical College. To determine the type of cabinet, locate the unique serial number on the cabinet. This area should also contain the BSC type. If unable to locate this information, contact EHS for further assistance.

If a gas leak occurs (e.g. valve left on or tube leak) inside a recirculating biological safety cabinet, over time, the gas would become more concentrated and could reach explosive levels. Since it is within a BSC, the user might not detect the leak and, upon ignition, the concentrated gas could explode. Therefore, natural gas or other flammable gases should not be used within recirculating biological safety cabinets.

Additionally, open flames can affect the airflow pattern of a BSC. According to the National Institutes of Health (NIH) and Centers for Disease Control (CDC), “Open flames are not required in the near microbe-free environment of a biological safety cabinet. On an open bench, flaming the neck of a culture vessel will create an upward air current which prevents microorganisms from falling into the tube or flask. An open flame in a BSC, however, creates turbulence which disrupts the pattern of HEPA-filtered air supplied to the work surface,” leading to potential contamination of materials in the BSC.

**When possible, consider the following alternatives to using an open flame in a BSC:**



- **USE** of an Electric Bunsen Burner ([click for example](#)) as it combines the efficiency of a gas burner with the safety and control of an electric heater.



- **USE** of a Bact-cinerator ([click for example](#)) to sterilize loops and needles safely and conveniently by preventing infectious spatter and/or cross contamination. This also safeguards laboratory personnel from an open flame or hazardous gas.



- **USE** of pre-sterilized inoculating loops, spreaders and needles.

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- **USE** of a Bead Sterilizer to provide a safe, effective and convenient method for sterilizing your instruments, and ensuring they are free of pathogens and microbial contaminants; without using gases, flames or chemicals.



- **USE** of pre-autoclaved forceps, scalpels, etc. in covered autoclavable plastic containers or the special sleeves supplied for this use by various companies.

### References

**Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinets**, 3<sup>rd</sup> edition. Department of Health and Human Services,, Centers for Disease Control and Prevention and National Institutes of Health, September 2007.

<http://www.cdc.gov/biosafety/publications/index.htm>