

USE OF NATURAL GAS IN BIOSAFETY CABINETS

INTRODUCTION:

The Wayne State University Biosafety Program actively discourages the use of open flames and natural gas in Biosafety Cabinets (BSCs). BSCs provide a near-sterile work environment through the laminar flow of HEPA filtered air over the interior work surface. The introduction of an open flame into this environment disrupts the laminar air flow, which compromises protection to the worker and the sterility of the product. In addition, the use of natural gas/open flames in this environment has resulted in a number of accidents in academic research institutions. If such equipment is deemed essential to research activities, then Principal Investigators are responsible for reviewing such practices and taking steps to mitigate the risks involved.

RISKS:

Open flames and excessive heat can:

- disrupt airflow, resulting in:
 - increased exposure risk to the researcher
 - increased potential for product contamination
- damage HEPA filters, or melt the adhesive sealing the filter in place, leading to loss of BSC integrity and expensive repairs
- degrade reagents
- reduce viability of agents/cell lines
- create an uncomfortable work environment

Use of natural gas can rapidly generate an explosive environment within a BSC, where air is recirculated.

ALTERNATIVES:

As in all cases, it is the PI's responsibility to review research activities and employ safer strategies whenever warranted. In this case, these alternatives include:

- Disposable loops/spreaders
- Electric Bunsen burners
- Electric incinerators
- Hot bead sterilizers



environment of a BSC¹ and should only be utilized when “deemed absolutely necessary”.

The NSF/ANSI standard 49 addresses the plumbing of gas to a service valve in the BSC stating that “this practice should be avoided”² due to the reasons outlined above.

BSC manufacturers do not recommend the use of natural gas and state that:

- such use is “at your own risk”³
- they do not endorse the use of flammable gases within the BSCs under any conditions⁴
- the best solution to this problem is the elimination of flammable gas use with BSCs⁴

FURTHER METHODS TO MITIGATE RISK

If, after consultation with the WSU Biosafety Group, it is determined that an open flame, or plumbed gas is essential to your research activities, safer alternatives to the traditional Bunsen burner are available, e.g.:

- Safety lab gas burners
- Touch-o-matic Bunsen burners

In addition, ensure that the following safety steps are taken:

- Use the correct tubing (butyl rubber hose)
- Place the unit to the rear of the BSC in order to minimize the effects on laminar air flow
- Minimize the amount of flammable material present in the work area
- Ensure that an external gas shut off valve is installed, accessible, and that lab personnel are appropriately trained

RESOURCES:

1. Biosafety in Microbiological and Biomedical Laboratories, [5th Edition](#)
2. [NSF/ANSI Standard 49](#) – 2008: Biosafety Cabinetry: Design, Construction, Performance, and Field Certification
3. Nuaire Technical Bulletin: [Use of Natural Gas/Bunsen Burner within a Biological Safety Cabinet](#)
4. The Baker Company, Technical Bulletin: [The Use of Flammable Gas in a Biological Safety Cabinet](#)

REGULATORY REQUIREMENTS:

- Are there any regulations that prohibit use of a Bunsen burner or natural gas in a BSC?

Currently, no such regulations exist. However, the CDC and the NIH have addressed this, stating that “open flames are not required in the near microbe free