

Fume Hoods vs Biosafety Cabinets

EH&S Annual Primer



Objectives

Distinguish between a fume hood and biological safety cabinet (BSC).

Understand functions of a fume hood versus biological safety cabinet.

How to effectively use a fume hood and biological safety cabinet

Understand the maintenance process of a fume hood and biological safety cabinet.

Distinguish between fume hood and biosafety cabinet

Fume Hood

- Chemical hood



Biological safety cabinet

- BSC
- Biosafety Cabinet
- Tissue/Cell culture hood
- Laminar flow hood
- Clean air bench



Distinguish between a fume hood and BSC

- ▶ designed to remove chemical fumes and aerosols away from the work area.
- ▶ designed to provide both a clean work environment and protection for employees who create aerosols when working with biological hazards.



Fume hoods



BSC's



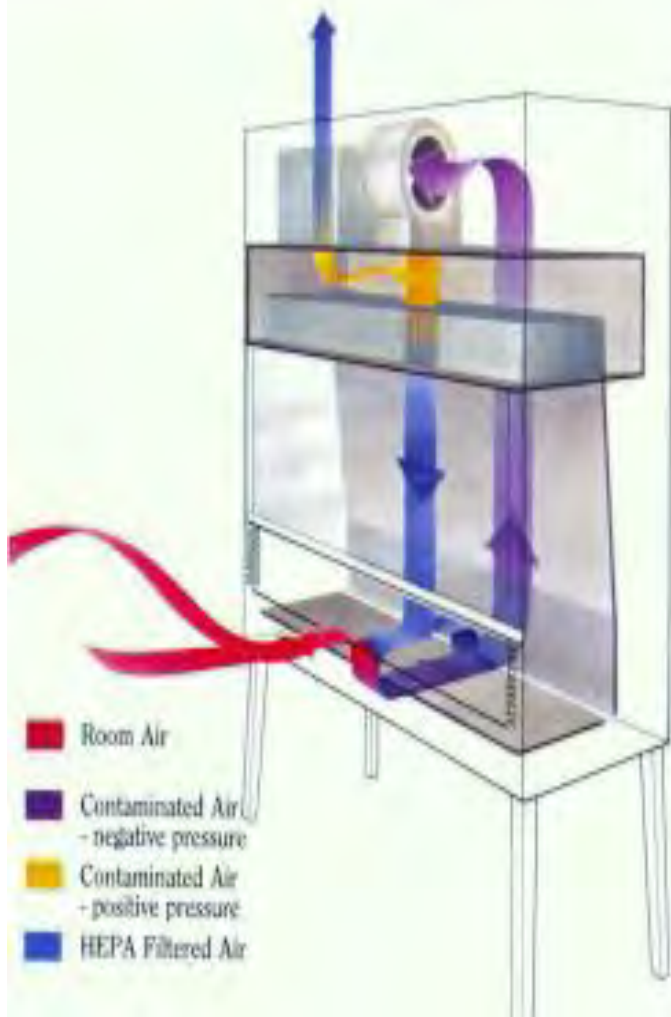
Biosafety Cabinets

BSC's

Biosafety Cabinet Operation

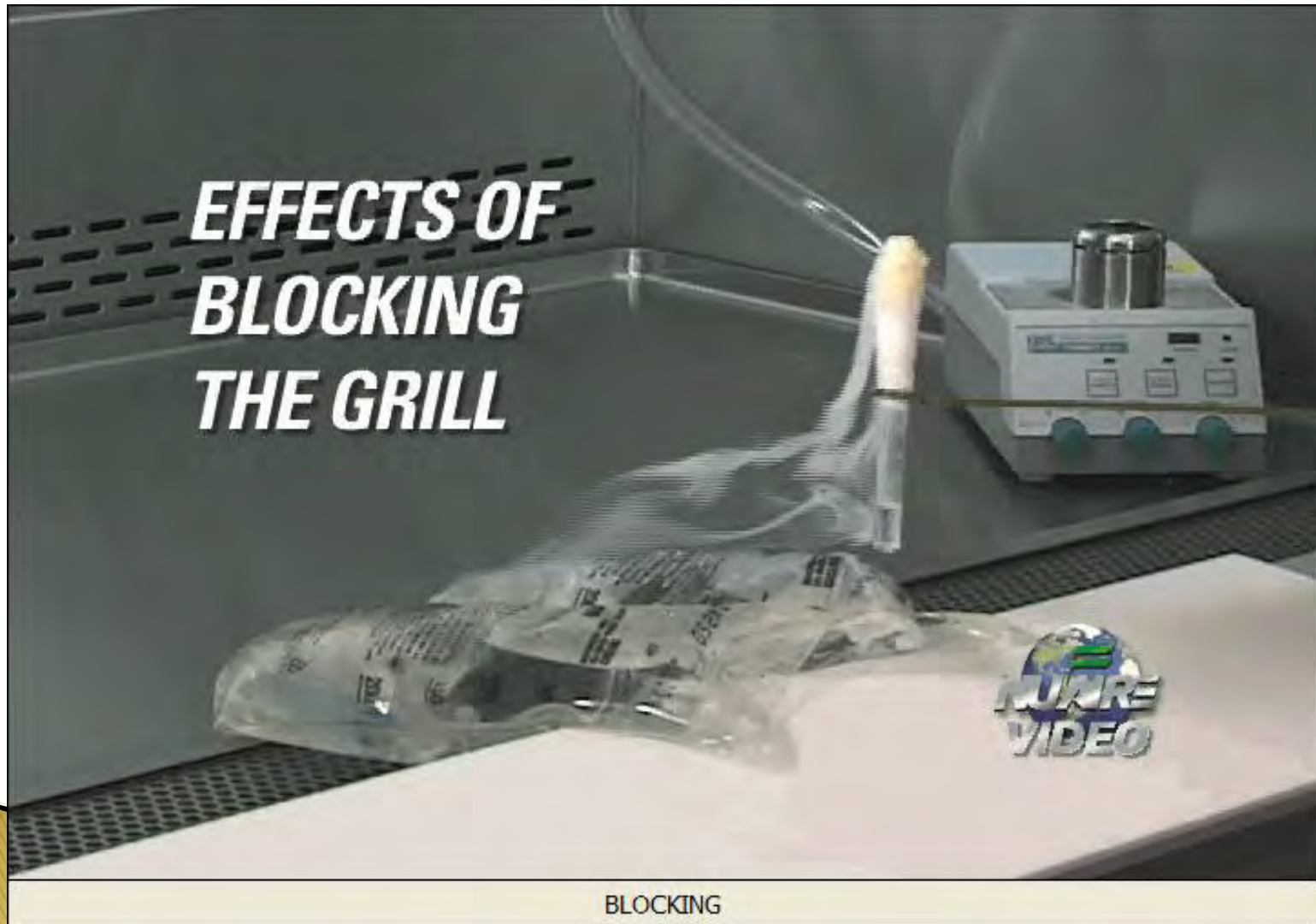


Biosafety Cabinet (BSC) Basics



- ▶ Don't overcrowd the interior, disrupting air flow.
- ▶ Do not rest anything on front grille, including arms.
- ▶ Materials should be at least 4" inside the sash. Keep contaminated materials to the back of hood.
- ▶ Do not modify original hardware provided. Protect the integrity of the BSC. Contact EH&S to advise

Biosafety Cabinet Operation



BSC Basics

Standard Operating Procedure

Start Up

1. Turn off ultraviolet light as soon as you enter the room.

2. Turn on all blowers and cabinet illumination lights.

3. Open sash to appropriate working level.

3. Allow five minutes of operation to purge system; check flow alarm system audio and visual alarm function if so equipped.

4. Decontaminate readily accessible interior surfaces with a disinfectant appropriate for the agents or suspected agents present.

Shut down

1. Decontaminate and remove all items from interior work area.

2. Decontaminate readily accessible interior surfaces with a disinfectant appropriate for the agents or suspected agents present.

3. Allow five minutes of operation to purge system.

4. Turn off cabinet illumination lights and blower. Close the sash.

5. Turn on ultraviolet light. If light is not used, leave blower on and sash open

BSC Basics

UltraViolet Light

- ▶ UV irradiation only **MAINTAINS** the disinfected status of a cabinet. It does not penetrate beneath dust particles or lab supplies.
- ▶ UV lights are only effective for up to one year.
- ▶ The fan should be off, and the sash should be closed when the UV light is being used.
- ▶ The UV lamp should **NEVER** be on while working in the cabinet/room. Exposure to UV light can cause eye and skin burns.
- ▶ Supplies should not be placed under UV light, light will degrade plastic.

Safety Summary	
Approved by:	Title: Ultraviolet (UV) Lights
David A. Brown, Director, EH&S	Effective Date:
<i>DA Brown</i>	Revised Date:
Ultraviolet (UV) lights are used in the laboratory to sterilize/decontaminate...	Section:
"Prim...	BIO

safety cabinets to
rose and ethidium gels

Installation and use of
CDC and NIH, states:

SCs. If installed, UV lamps
and dirt that may block
light. The lamps should
that the appropriate

BSC Basics

Open Flames

- ▶ Potential fire or explosion hazard
 - never leave open flame unattended.
- ▶ Avoid using open flames.
 - “Open-flames are not required in the near microbe-free environment of a biological safety cabinet” (CDC).
- ▶ Flame disrupts the air flow and may damage HEPA filters.
- ▶ Inactivates manufacturers warranties on the cabinet.



BSC Basics

Alternatives to Open Flames

- ▶ Use disposable or autoclaved items
- ▶ Use alcohol to sterilize any glass being used. Allow it to evaporate or dry with a Kimwipe.
- ▶ Properly use a pilotless burner, electric incinerator, or touch-plate micro-burner to provide a flame on demand.



BSC Basics

Decontamination/Disinfection



▶ Decontamination must be performed by Precision Air in the following events:

- Moving of BSC
- Lab closeout
- Maintenance
 - HEPA filter replacement
- Clean-up of a major contamination event

Decontamination

- ▶ Stainless steel surfaces should be disinfected with 70% ethanol or isopropanol on completion of work or after any spill.
- If bleach solution is used, follow with isopropyl alcohol to remove residue
- ▶ The work surface should be lifted periodically (with cabinet running). Clean the spill area to prevent microbial growth and contamination.

Disinfection



Fume Hoods

Fume Hood Basics

Sash Variations

- ▶ Fume hoods in Hanes, Gray, NRC, PTCRC utilize this style of sash
- ▶ Allows full opening of hood face



Vertical Sash

- ▶ Provides protective shield between user and contamination source
- ▶ Fume hoods in A1 and A1a utilize this style of sash
- ▶ Full height access afforded at partial openings



Combination Sash Vertical and Horizontal

Fume Hood Basics

Exhaust Variations

- ▶ System keeps exhaust volume constant, but face velocity fluctuates with sash opening
- ▶ Used in Gray, Hanes, PTCRC, Friedberg.
- ▶ Fume containment compromised if sash is too high

Controlled Air Volume
(CAV)

- ▶ Keeps face velocity at a constant 100 fpm regardless of sash height
- ▶ Used in NRC, Dean Building (A1) and A1a

Variable Air Volume
(VAV)

Fume Hood Basics

Velocity & Occupancy Monitors

- ▶ Measures face velocity
- ▶ Monitor should read ~100 fpm or more



Velocity Monitor

- ▶ Measures differential pressure
- ▶ Contact EH&S if gauge needle is at zero or acts erratically.



Magnehelic Gauge


- ▶ Allows fume hood to go “low flow” when no one is using the hood.
- ▶ Found in NRC building



Occupancy Sensor

Fume Hood Basics

4 main principles of safety



Adequate
Exhaust

Uniform
Airflow

Proper
Setup

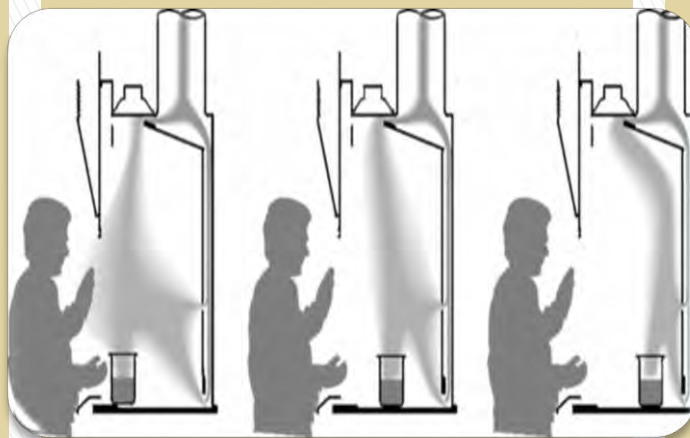
Closed
Sash

Fume Hood Basics

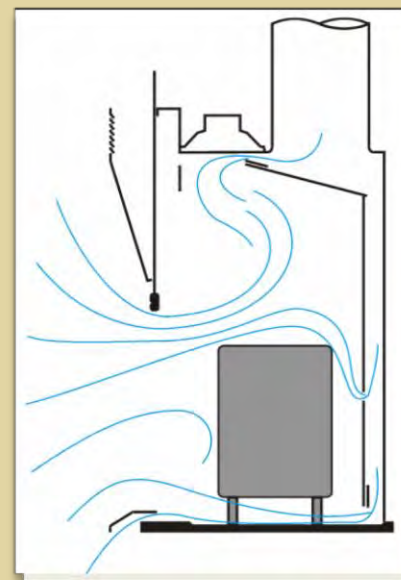
Proper Setup



Avoid Clutter, Do not cover airfoil



Put equipment to rear of hood

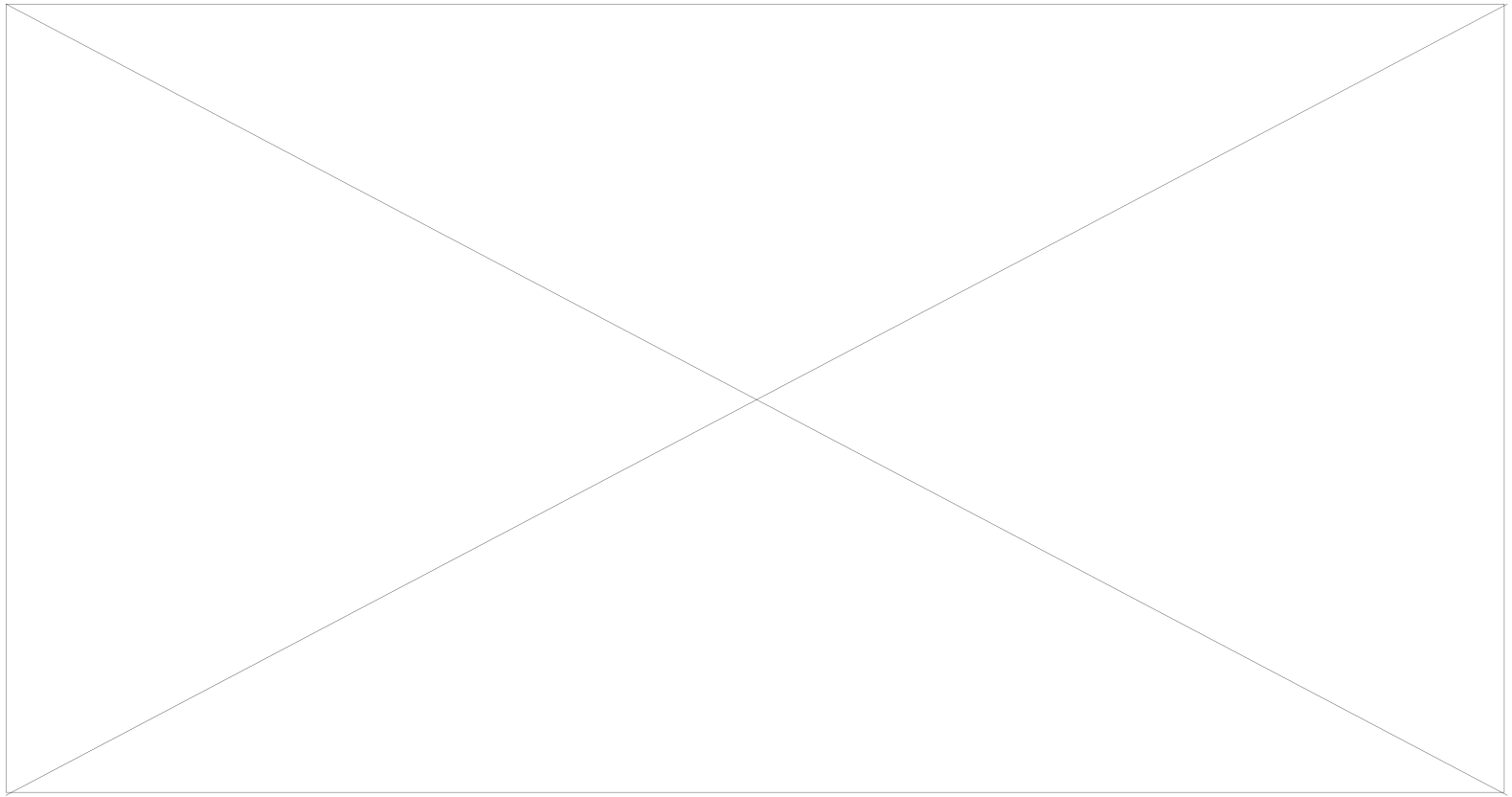


Recommended

Raise Bulky Equipment

Video

- ▶ **Overcrowding/Blocking**



Fume Hood Basics

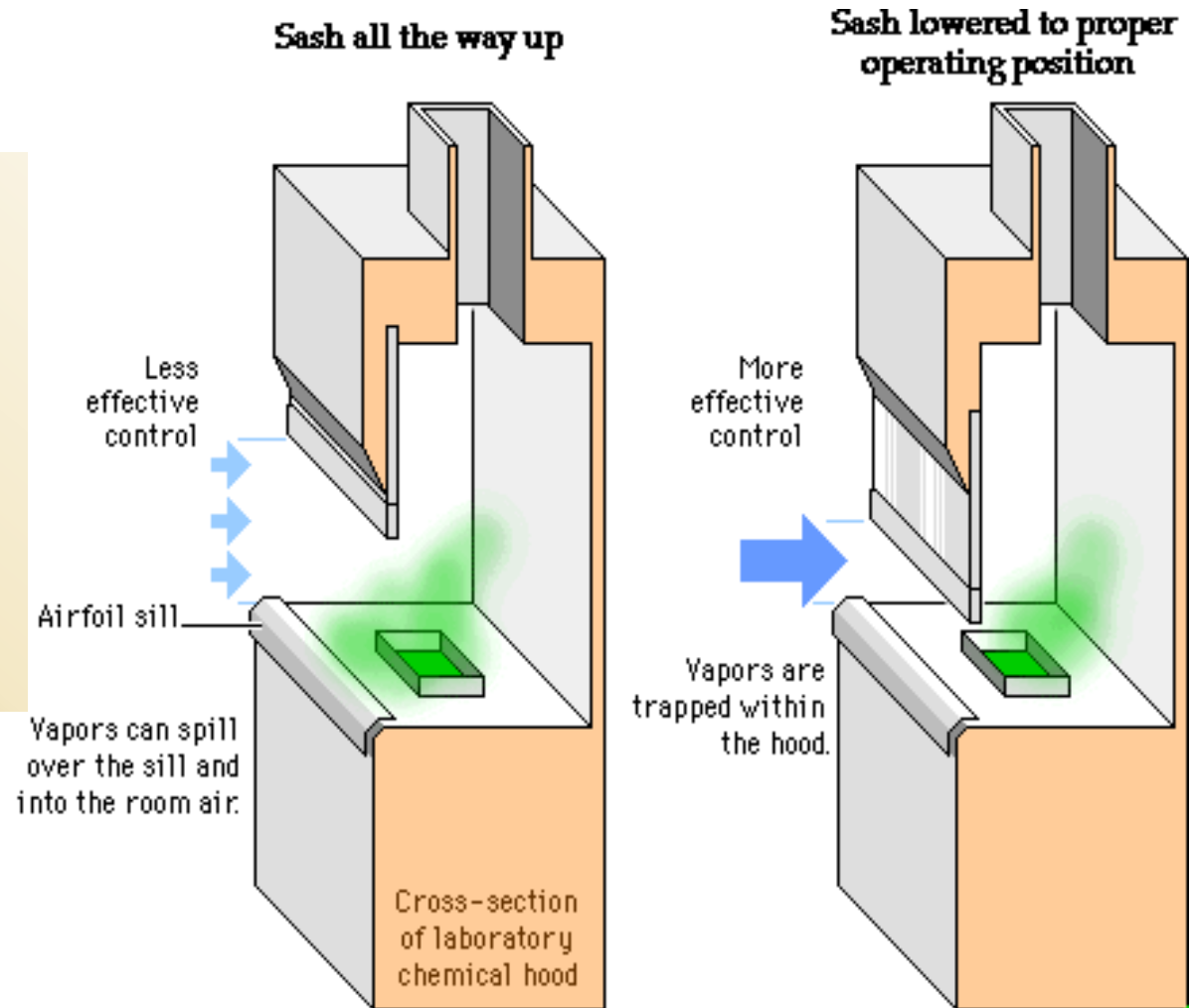
Proper Setup



Fume Hood Basics

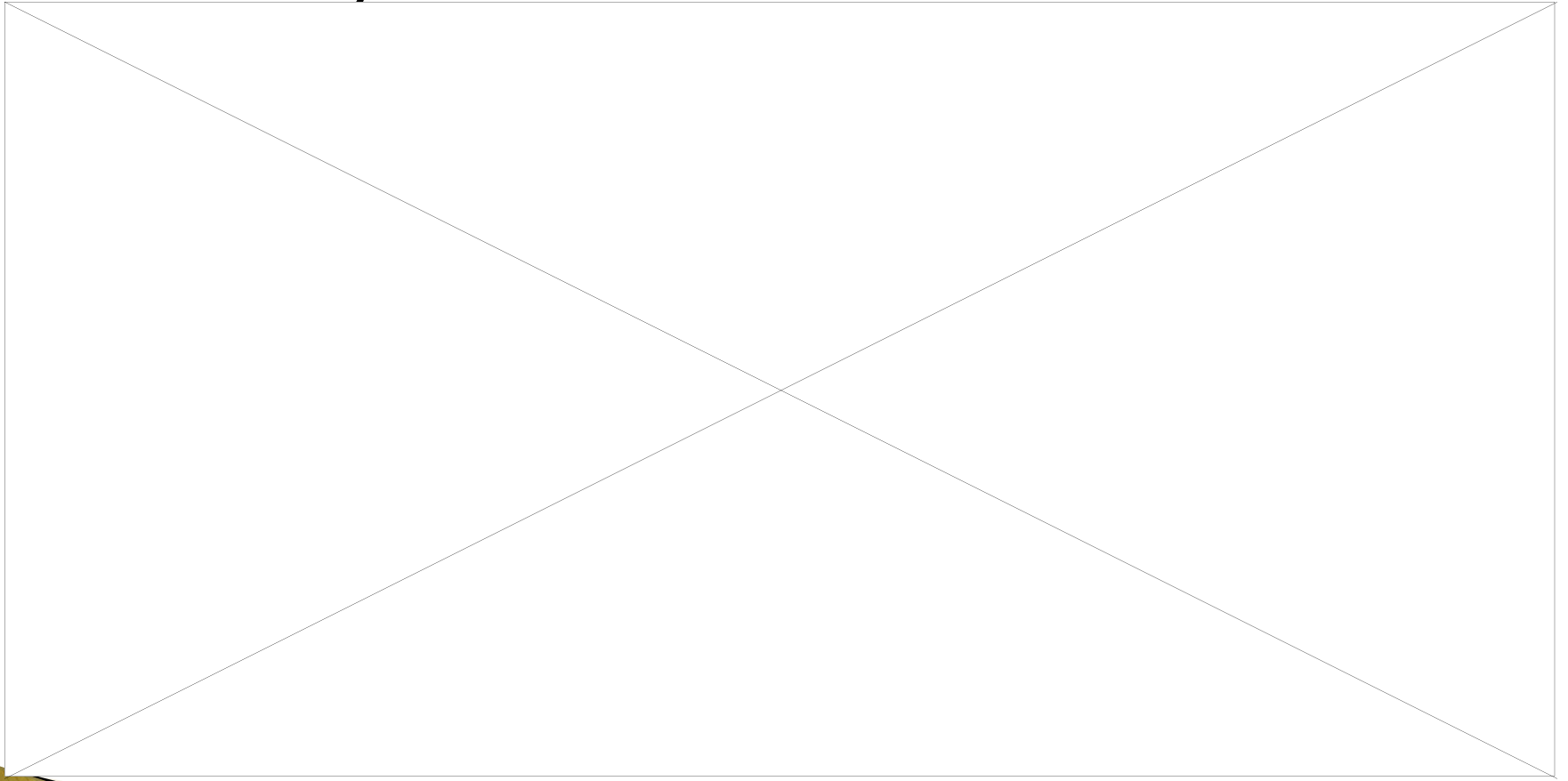
Closed/Lowered Sash

Modern fume hoods have improved containment however, it is safer to work with the sash lowered



Videos

Sash Height & Air Flow



Fume Hood Basics

Safe Work Practices in Hoods

- ▶ Work 6" back into hood
- ▶ Do not put head inside hood when contaminants are being generated.
- ▶ Do not use hood for storage or waste disposal
- ▶ Keep sash closed as much as possible
- ▶ Keep exhaust slots and airfoil clear of obstructions
- ▶ Minimize foot traffic past face of hood
- ▶ Keep lab doors closed
- ▶ Use appropriate barricades if there is potential for explosion
- ▶ Do not modify or alter hood in any
- ▶ Do not place electrical outlets or other sources of sparks in hood when flammable substances are present

Certification/Testing of BSC / Fume hoods

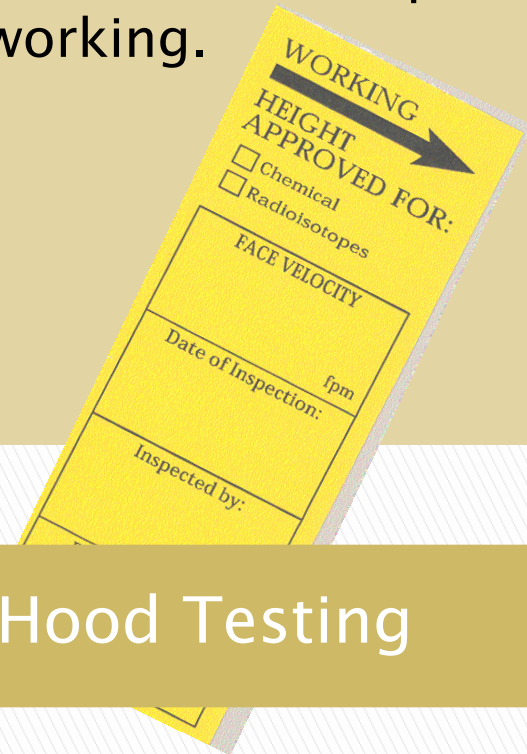
BSC/Fume Hood Certification/Testing

- ▶ Certified annually by Precision Air.
- ▶ If working with chemotherapy drugs, the BSC should be certified bi-annually by Precision Air.



Biosafety Cabinet Certification

- ▶ Tested annually by EH&S.
- ▶ Face velocity should be ~ 100 fpm
- ▶ Yellow tag indicates height where 100 fpm is achieved and where sash should be placed when working.



Fume Hood Testing

Problems

- ▶ Contact Engineering if you have problems with your fume hood.
- ▶ Common problems would include:
 - Loss of air flow/cabinet not working
 - No reading or erratic reading from magnehelic gauge
- ▶ Discontinue use of fume hood until problem is fixed.
- ▶ Contact Precision Air for all problems with BSC.

Questions

The purpose of the fume hood is to protect the user from the chemical, biological and/or radioactive material being used?

- A. True
- B. False

The purpose of the biosafety cabinet is to protect the user and product?

- A. True
- B. False

What is the frequency of have the BSC and/or fumehood certified or tested?

- A. Annually
- B. Monthly
- C. Every two years
- D. When ever there is extra money in the budget

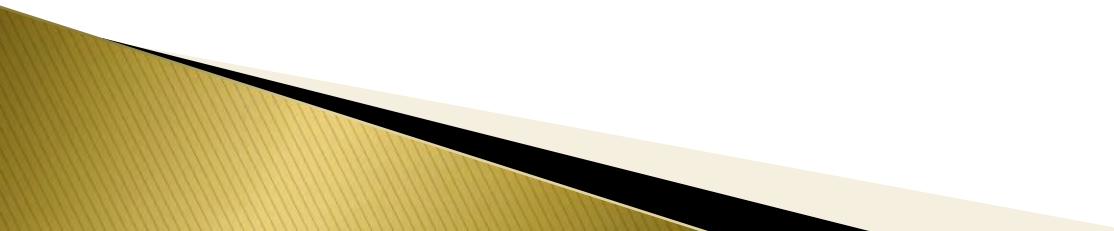
When the fume hood quits working, who should be called?

- A. Engineering
- B. Principal Investigator
- C. Nobody, continue working in the fume hood

At what level, should the sash on a fume hood when working a chemical?

- A. Sash should be extended upwards as much as possible.
- B. Sash should be closed.
- C. Sash should be open 12 to 18 inches

Who do you call FIRST if the BSC is not working?

- A. Precision Air
 - B. Engineering
 - C. EH&S
 - D. Nobody, continue working in the BSC
- 

Fume hoods with horizontal sashes can be found at WFUHS?

A. True

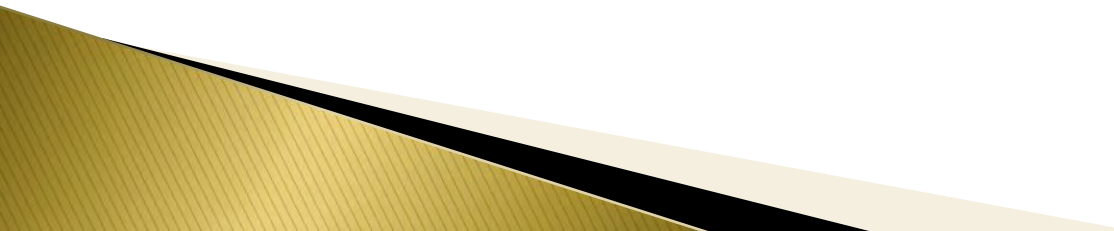
B. False

Open flames can be left unattended?

A. True

B. False

Who do you call if a modification is needed on your biosafety cabinet or fume hood?

- Your friend to give you a hand with the modification.
 - Environmental Health & Safety
 - Environmental Services
 - Your department chair
- 

Which of the following are part of the Four Principles of Fume Hood Safety?

1. Adequate Exhaust
2. Closed Sash
3. Uniform airflow
4. Proper Setup
5. All of the above