

Fume Hood Use

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The information in this document is based on CSA 316.5-15 and ASHRAE 110-2016.

SCOPE

This document applies to anyone who works with laboratory fume hoods at the University of Ottawa. It is meant to be read in conjunction with applicable legislative and guidance documents, including uOttawa internal procedures.

This document **does not** address the use and maintenance of recirculation (ductless) fume hoods, whose use is strongly discouraged due to their regular maintenance and care requirements. The maintenance of recirculation (ductless) fume hoods is the responsibility of the fume hood owner. Facilities is responsible for maintaining only ducted fume hoods.

This document **does not** apply to biological safety cabinets (BSCs) or laminar flow hoods, which are not intended to prevent chemical hazards. HEPA filter replacement is the responsibility of the Faculty/Service where the equipment is located. For information on BSCs and laminar flow hoods, contact the [Risk Management Specialist – Biosafety](#) at the Office of Risk Management.

This document **does not** apply to vented storage cabinets or articulated exhaust arms, as their requirements differ greatly from those of standard, chemical fume hoods.

PURPOSE

This document aims to define the responsibilities of individuals in the workplace with regard to the use of fume hoods at the University of Ottawa. For information on the maintenance of fume hoods and associated systems, refer to the *Fume Hood Maintenance Procedure* available from Facilities.

DEFINITIONS

Facilities – the University service responsible for inspecting, maintaining and certifying fume hoods at the University of Ottawa. You can reach Facilities by contacting your Facility Manager or by calling extension 2222 on any University of Ottawa landline.

Office of Risk Management (ORM) – promotes an environmentally responsible, safe and healthy environment for University staff and faculty members, students and visitors, while supporting the University's teaching and research missions.

Supervisor – means a person who has charge of a workplace or authority over a worker. The determination as to whether a person is a supervisor is not dependent on that person's job title. The determination depends on whether the person has charge of a location (for example, an office or laboratory) where the work is done on a paid or unpaid basis or on whether the person directs the work done by workers, students, visitors, volunteers, or learners.

*Worker*¹ – means any of the following:

- A person who performs work or supplies services for monetary compensation.

¹ Students are not workers and are not subject to the health and safety legislation applicable to employees; however, the University applies the principles of this legislation to students. Students are responsible for conducting themselves in a proper manner to ensure their own safety as well as that of others, and must adhere to University procedures and directives on health and safety.

- A secondary school student who performs work or supplies services for no monetary compensation under a work experience program authorized by the school board that operates the school in which the student is enrolled.
- A person who performs work or supplies services for no monetary compensation under a program approved by a college of applied arts and technology, university or other post-secondary institution.
- Such other persons as may be prescribed who perform work or supply services to an employer for no monetary compensation.

WHAT IS A FUME HOOD?

A fume hood² is a mechanically ventilated, partially enclosed workspace in which harmful materials can be handled more safely. The primary function of a fume hood is to capture, contain and exhaust gases, vapours, and aerosols generated within the fume hood enclosure, thereby helping to protect the user. Users access the interior of the fume hood through a vertical and/or horizontal sash, which also serves as a physical barrier between the work area and the user. Fume hoods are used in various workplaces, including the University's teaching and research labs.

In the case of a ducted fume hood, ducts and fans ensure that the fume hood captures airborne contaminants, transports them out of the work area, and eventually discharges them into the atmosphere outside the building where the fume hood is located. A ducted fume hood is usually constructed from non-combustible materials. In some cases, a pollution control device is also part of the system.

Some fume hoods are designed to protect workers from specific hazards, such as perchloric acid and radioisotopes. **These types of hoods are subject to additional requirements and procedures.** Speak to your supervisor for more information on fume hoods used to handle specialized materials.

Sashes

Vertical

A sash is the movable panel, made of glass or some other material, which covers the face area of a fume hood. Sashes can be vertical, horizontal, or a combination of both (hybrid type).

Vertical rising sashes, which adjust up and down, are the most common type of sash for fume hoods at uOttawa. The sash controls the size of the face opening. Some fume hoods are equipped with a sash stop that prevents the sash from being opened above the maximum safe working height. Sash stops should not be removed during normal operations or otherwise modified. Stickers on the side of the fume hood face indicate the maximum safe working height (operation point). Appendix 1 provides an example of a sticker.

When working inside a fume hood, a user must position the vertical sash as low as possible to work comfortably and never above the sash stop or the posted maximum safe working height. Working with the sash above the indicated safe operation point may compromise the fume hood's face velocity and jeopardize its containment effectiveness. Moreover, the sash also serves to protect the user's face and placing the sash too high makes it ineffective as a protective shield. The sash should

² Definition adapted from CSA Z316.5-15.

only be raised above the maximum safe working height, overriding the sash stop, to move materials or equipment in or out of the fume hood; however, the sash must be returned to the safe working height before beginning work with hazardous materials.

For fume hoods equipped with audible alarms, raising the sash above the safe working height will lower face velocity and trigger the local audible alarm as a warning to return the sash to a safe working height. For more information on this topic, see *Alarms*.

Horizontal

Horizontal sashes function much like vertical sashes, except that instead of moving up and down, they move side-to-side. This design allows the sashes to act as a series of movable, protective shields that limit the size of the fume hood opening to varying degrees. Therefore, the fume hood is never in a fully open position. The user slides the panel(s) to minimize the face openings, keeping a panel between the user and the inside of the fume hood while still being able to work safely and comfortably inside the fume hood. The openings between panels should be minimized.

When not in use, the fume hood sash (vertical or horizontal) should be in the fully closed or lowered position. If the sash is difficult to move or immovable, if a panel is missing, or if other deficiencies are noted, notify your supervisor and other fume hood users in your lab, and call Facilities at ext. 2222. Clearly state the nature of the problem; Facilities will provide a work request number. Next, mark the fume hood as out-of-service and secure it: refer to Appendix 2 for make-safe and lock out procedures. The fume hood must not be returned to service until the requisite repairs and subsequent certification have been completed.

RESPONSIBILITIES

Workers (including students)

- Must read this document and receive necessary instruction prior to working inside a fume hood.
- Must follow the requirements for working in a fume hood as set out in this document as well as any additional requirements determined by the area supervisor.
- Must immediately report any currently or potentially hazardous situations to their supervisor.
- Must not perform work inside a malfunctioning fume hood.

Supervisors

- Must conduct and document hazard assessments that identify the work to be performed, and the materials to be handled, in the fume hood. Supervisors must also maintain such documentation.
- Must ensure that laboratory workers are trained in the proper use of fume hoods in their lab. At a minimum, such training must include the recommended topics listed in Appendix 3.
- Must ensure that all fume hood users follow prudent, safe work practices when operating fume hoods.
- Must regularly inspect their lab to ensure proper fume hood usage and operation.
- Must ensure that fume hoods currently undergoing maintenance or emergency shutdowns are made safe by removing hazardous materials and/or decontaminating them as required.

- In conjunction with the Faculty/Service, must ensure that necessary filters (i.e. carbon, HEPA, etc.) are maintained and replaced at the required frequency.
- In conjunction with the Faculty/Service, must ensure that pollution control devices (i.e., scrubbers) are maintained and replaced at the required frequency.

Facilities

- Investigates fume hood system operational deficiencies and issues recommendations.
- Performs regular preventive maintenance, including regular testing and repair if necessary, of fume hoods and associated exhaust systems.
- Informs Facility Managers of scheduled/emergency work. Communications should include anticipated shut down dates (including anticipated duration), affected areas, what is expected of users, and a point of contact for questions related to the work.
- Locks out fume hoods undergoing maintenance and repair. In addition to locking out the fume hood, installs signage (Appendix 2) on out-of-service fume hoods.
- Documents all fume hood maintenance, repair and intervention activities in Maximo. Provides maintenance information to Facility Managers and/or Faculty Health, Safety and Risk Manager.
- Does not handle laboratory equipment.
- Reports incidents of non-compliance, misuse, crowded hoods, etc. to the area supervisor and/or the local Health, Safety and Risk Manager (HSRM).

Mechanical Department

- Responsible for the mechanical components of fume hoods, such as fans, motors, belts, etc. Conducts annual preventive maintenance, including:
 - Checking belt drive
 - Inspect to determine if pulley grooves are worn
 - Check pulley mounting on shaft
 - Check if belts are used or worn (replace as required), adjust tension (as required)
 - Cleaning motor, fan, damper blades and ductwork
 - Checking condition (paint, corrosion, etc.)
 - Checking fan for proper functioning (vibration, noise, etc.)
 - Checking motor and fan bearing with stethoscope
 - Checking tightness of ductwork and canvas (repair as required)

The Mechanical Department will document any conditions or repairs and maintain records.

Instrumentation Department

- Responsible for certifying fume hoods and adjustments to air balancing systems. Conducts annual preventive maintenance, including:
 - Testing service controls (gas, air, water, etc.) located at the hood
 - Checking laboratory air balance and make-up air
 - Measuring the face velocity of the individual hood, comparing it to established standards, and making necessary modifications

- Checking the airflow monitors/alarms
- Visually checking the liner
- Visually checking the user components of the fume hood, including the sash (for damage or corrosion), proper lubrication, operation, interior liner, etc.

The Instrumentation Department will document any conditions or repairs and maintain records.

Electrical Department

- Responsible for any electrical repairs; maintenance is performed when required.

Office of Risk Management

- Provides information to users on appropriate legislation, codes, standards and best practices for the selection, installation and use of fume hoods.
- Assists faculties and departments in interpreting and complying with this document and with the *Occupational Health and Safety Act*.

Facility Manager/Health, Safety and Risk Manager

- Coordinates shutdowns of affected fume hoods with Principal Investigators, Lab Managers, users, etc.
- Liaises between their respective faculty or service and Facilities.
- Verifies, and confirm with Facilities, that work areas are ready for maintenance.

TYPES OF FUME HOODS

In order to limit current and potential hazards, users must understand that they may encounter different types of fume hoods while working at uOttawa. Each fume hood type should be conspicuously labelled, especially fume hoods that are used for specific hazards, such as perchloric acid, radiation, etc.

Constant Air Volume (CAV)

The overall volume of air exhausted from this type of hood remains constant. As the sash is lowered or raised, the face velocity of the fume hood correspondingly increases or decreases. **It is very important for users to know that when they work with hazardous materials in this type of hood, they must properly position the sash no higher than the marked safe working height** to maintain an optimum face velocity of 80-to-120 fpm (0.40 – 0.60 m/s).

Variable Air Volume (VAV)

These hoods maintain a constant face velocity as the sash is lowered or raised. When the sash is moved, the volume of air exhausted changes to maintain an average face velocity within calibrated parameters.

High Performance (HP)

Although their operational face velocity may be less than 60 fpm (0.3 m/s), high performance fume hoods provide appropriate containment for hazardous operations while using less energy. Such high performance fume hoods are becoming more common with every renovation and new construction.

Perchloric Acid Hood

These hoods are made from polyvinyl chloride (PVC) or polypropylene to resist the corrosive vapours of the highly concentrated acids for which they are designed. Typically, the window sash is made from a polycarbonate instead of glass. These hoods feature ventilation that is equipped with wash-down systems to prevent the buildup of perchlorate crystals, which result from certain acidic reactions and which are both explosive and shock sensitive. **Perchloric acid hoods require specific, standalone use and maintenance procedures that are not covered in this document.**

Walk-in Fume Hoods

Walk-in fume hoods sit directly on the floor and feature a large, deep chamber that can accommodate larger equipment or experimental set-ups. They are similar in design to conventional hoods, and may be equipped with both vertical and horizontal sashes. The same principles of use apply.

Ductless Fume Hoods

Ductless fume hoods are portable cabinet devices that serve as a fume hood. They recirculate filtered air from a hood or enclosure directly back into the work environment. Consequently, these hoods do not feature a duct system that vents contaminated air to the outdoors. **The University of Ottawa does not recommend the use of ductless fume hoods.** Note that an extensive risk assessment must be conducted prior to acquiring or using a ductless fume hood. The local Health, Safety and Risk Manager (HSRM) can provide assistance.

Note that Facilities does not maintain ductless fume hoods, whose maintenance requires regular filter changes, face velocity assessments, etc. Laboratory PIs and/or Lab Managers are responsible for the regular maintenance of equipment within their lab, including ductless fume hood maintenance.

Biological Safety Cabinets

This document **does not** apply to biological safety cabinets (BSCs) or laminar flow hoods, which should never be used to control chemical hazards. For information on BSCs and laminar flow hoods, contact the [Risk Management Specialist – Biosafety](#) at the Office of Risk Management.

Fume Hoods for Use with Radioactive Materials

The Canadian Nuclear Safety Commission (CNSC) has further, specific requirements for the use of radioactive substances within a fume hood.

For additional information or clarification on the use of radioactive materials in a fume hood, contact the [Risk Management Specialist – Radiation](#) at the Office of Risk Management.

FUME HOOD OPERATION

General Work Practices

- i. Check the fume hood before every use. If you spot any deficiencies, do not use the fume hood and immediately report these deficiencies to your supervisor.
- ii. For conventional fume hoods, effective user protection generally requires a face velocity of 0.4 to 0.5 m/s (80-to-100 fpm). Quickly check the face velocity by verifying the control monitor on the side of the fume hood (Appendix 6) or by holding a Kimwipe® or tissue up to the fume hood opening. The Kimwipe® or tissue should be gently pulled into the hood. For further information on face velocities, refer to *Table 3 – Inflow Face Velocity Ranges for Standard Performance Fume*

Hood in CSA Z316.5-15. For high performance fume hoods, refer to the manufacturer's specifications.

- iii. Keep equipment, products, and materials within the hood to a minimum; **fume hoods are not intended for storing material or equipment.**
- iv. Work with the vertical sash at the lowest possible level. Note the safe operation sticker(s) on the side of the fume hood sash (Appendix 1). Keep the sash below this level.
- v. If the hood is equipped with horizontal sashes, work with horizontal sashes between you and the fume hood opening. Maintain sashes as closed as possible.
- vi. Keep equipment at least 15-to-20 cm (6-to-8 inches) away from the fume hood edge.
- vii. Raise large, bulky items to allow air to flow underneath them. Place items such that they do not inadvertently restrict airflow within the fume hood.
- viii. Do not obstruct or otherwise block vents, slots, or baffles in the fume hood.
- ix. Lower (for vertical sashes) or close (for horizontal sashes) sashes when the fume hood is not in use.
- x. Avoid creating cross drafts outside the hood or turbulence inside the hood.
- xi. Facilities will service and maintain the mechanical systems of fume hoods on an annual basis. Check the most recent date on the inspection sticker. If the fume hood has not been serviced within the previous calendar year, report the situation to your supervisor, lab manager or facility manager. Do not use this fume hood until Facilities has certified it as operational.
- xii. Wear the personal protective equipment required for the work, even when conducting work within a fume hood.
- xiii. Be prepared to handle any potential spills, either inside or outside the fume hood. Spill kits are generally available in each lab; specialized spills kits (i.e., for mercury, hydrofluoric acid, etc.) may be required. The Faculty Health, Safety and Risk Manager and/or the [Office of Risk Management](#) can provide training on how to use spill kits.
- xiv. Do not place your head in a fume hood.
- xv. Do not place electrical connections inside a fume hood.

Fume hoods in which radioactive materials are used must also:

- xvi. Be equipped with a continuous monitoring device that verifies that the hood is functioning properly. It must also feature a visual or auditory alarm that is triggered by reduced airflow.
- xvii. Be ducted vertically. If horizontal ducting runs do exist, detailed information must be provided to show how to limit the collection of condensates or liquids. Horizontal ducts must slope at least 2.5 cm per 3 meters (1 inch per 10 feet) downward in the direction of the airflow to a suitable drain or sump.

For additional information or clarification on fume hood requirements for radioactive substances, contact the [Risk Management Specialist – Radiation](#) at the Office of Risk Management.

Appendix 4 contains single-page user instructions to be posted in the workplace for users of different types of fume hoods.

Daily Maintenance

Fume hood users must check for the following conditions **daily**:

- i. fume hood has airflow (i.e., the alarm is operational)
- ii. work surfaces are clean and ready to use
- iii. the fume hood service controls (e.g., water, gas, air, etc.) are operating properly

- iv. the lighting and associated indicator lights/switches are operational
- v. the additional services (such as sink drains) are undamaged and free of obstructions
- vi. the sash, or sashes, operates properly
- vii. any electrical equipment is plugged in outside the fume hood in a way that allows the sash to be properly closed.

Facilities regularly conducts additional maintenance activities. However, if any concern regarding the fume hood's containment properties arises, users should safely relocate hazardous materials, when possible, and remove the hood from use by locking out the hood and affixing signs to the sash to prevent unintended use.

PERFORMANCE TESTS

Facilities conducts performance tests on all uOttawa fume hoods under conditions that represent regular operations. If the laboratory has issued standard procedures that affect the normal operation of the fume hood, the lab must submit to Facilities the conditions of use that correspond to these standard procedures. Facilities will record and replicate these conditions of use during its performance tests.

Facilities will inform the Facility Manager/PI/Lab Manager of the date and time of the fume hood performance test. If the performance test cannot be completed (because of an overcrowded fume hood, for example), Facilities will notify the user and the Instrumentation Department; the test will be postponed until corrective action is taken.

Inspection Sticker

Once the performance test has been conducted, Facilities will sign and date the inspection sticker located on the fume hood (Appendix 5). The signature serves to indicate that the fume hood has been inspected on the date indicated. If this inspection sticker is not immediately available to the fume hood user, the user must immediately notify the supervisor/Lab Manager/Facility Manager. Do not use the fume hood until the fume hood has been inspected.

FUME HOOD REPAIRS

All fume hood repairs must be coordinated by Facilities and managed using the Maximo work request system.

If a fume hood requires repair, the client must submit a work request through their Faculty or Service Facility Manager (unless Facilities has already opened a request). **In urgent cases, (i.e. an immediate hazard), the client may contact Facilities directly at ext. 2222.**

The client must clearly indicate the problem and where possible, make safe the fume hood. This may require the safe removal or transfer of hazardous products to an adjacent (or alternate) fume hood. The Lab Manager, Principal Investigator and/or the Facility Manager (or their delegate) will contact Facilities to confirm that the fume hood has been made safe for repairs. Users will not be allowed to work in the affected hood until it has been repaired.

Fume Hoods Requiring Additional Service

If performance test results indicate that additional repairs are required:

- i. The fume hood will be locked out to prevent unintentional use and marked as “out of service”. Signage will be placed prominently on the sash and the Lab Manager/Principal Investigator/Facility Manager will be notified.
- ii. The appropriate trade department will be notified (e.g. Mechanical Department, Instrumentation Department, etc.) via Maximo work request and a comment will be added to the existing work request. The Maximo request will be reassigned to the appropriate trade(s).
- iii. The appropriate tradesperson will perform the required repair, record it, and provide updated information to the client. The Instrumentation Department will re-test the face velocity.
- iv. Once the repair is complete, the work request will be closed and the appropriate trade department will notify the client that the repair is complete.
- v. Once notified by the appropriate trade department, the client can remove the “Out of Service” signage and lock out.

Facilities must formally notify the Principal Investigator, Lab Manager and/or Facility Manager (or delegates) of any repairs or adjustments. Facilities must also keep maintenance records for all fume hoods for which they conduct repairs. The University of Ottawa recommends that Principal Investigators/Lab Managers keep maintenance records for all fume hoods for which they are responsible.

PREVENTIVE MAINTENANCE

Facilities will notify the Facility Manager/Building Management Agent of any scheduled maintenance of fume hoods, and what is expected of users, at least seven calendar days before the scheduled maintenance. Facility Managers are responsible for relaying information about fume hood maintenance to the Principal Investigators, Lab Managers, Lab users, etc.

Scheduled maintenance could include:

- Belt changes
- Bearing inspection and lubrication
- Pulley adjustment
- Stack inspection
- Motor inspection
- Cleaning the
 - Mesh filters;
 - Dampers;
 - Heat recovery coils
- Etc.

Once users have been notified of scheduled maintenance dates and times, and prior to the arrival of Facilities personnel, individuals in charge of the fume hoods to be serviced must ensure that the work area and equipment inside and around the fume hood are secure and made safe. This could include emptying the fume hood, removing hazardous substances, removing excess items around the work area, pausing experiments, etc.

If Facilities personnel feel they cannot perform maintenance due to a health- or safety-related concern, they will not perform the work and immediately contact the Health, Safety and Risk Manager for Facilities (ext. 6992). The situation will be investigated and resolved with assistance from the relevant stakeholders.

Preparing Fume Hoods for Service (Make Safe)

Lab supervisors are responsible for ensuring that fume hoods are made safe before Facilities personnel arrive to conduct preventive or corrective maintenance. The term “to make safe” means to reduce hazards associated with fume hood maintenance to their lowest acceptable level; where this is not possible, the hazard must be suitably controlled to protect the personnel performing maintenance. Some such possible measures include:

- Removing hazardous materials (i.e. chemical products, radiation hazards, laboratory apparatus, etc.) from the fume hood. This could include relocating hazardous materials to an alternate, unaffected fume hood.
- Capping/closing containers inside the fume hood
- Gently cleaning the work surfaces, such as the accessible interior cabinet of the fume hood.
- Complete decontamination of the fume hood (if warranted by the maintenance work required).

The lab supervisor is responsible for informing Facilities of any additional hazard(s) that may be encountered as a result of the use of a given fume hood (i.e. radioactive substances, perchloric acid, etc.).

Remember, maintenance personnel are not regular laboratory users; it is critical that lab personnel remain on hand before and during repairs to provide additional information or clarification.

Emergency Repairs

In emergency circumstances, the urgency of repairs may dictate a shorter notification time. If this is the case, Facilities must immediately inform the Facility Manager, Administrative Officer and/or the Health, Safety and Risk Manager. This notification must include which fume hoods, sections and/or rooms are affected and the anticipated duration of the shutdown. **During emergency maintenance, affected fume hoods must not be used.** Stickers shall be applied on sashes to inform users of the repairs in progress and that the hoods cannot be used until repairs are complete. Facilities will lock out the affected hoods (where possible). If there is any doubt about the products that are within or near the hood, the Facilities workers must contact the Lab Manager, the Facility Manager, the Administrative Officer or the Health, Safety and Risk Manager prior to working in the area. If these individuals are not available, the workers must contact the Health, Safety and Risk Manager at Facilities (ext. 6992).

Once the emergency work and any subsequent performance tests are complete, Facilities will notify the affected users and will allow the fume hood users to use the hood.

FUME HOOD TRAINING

It is recommended that users complete a training module to demonstrate that the user knows how to properly use and operate fume hoods. This training would also serve to dispel misinformation, such as that fume hoods are the sole source of protection, or that any type of substances can be used in any type of fume hood, etc. Appendix 3 contains a list of sample topics that could be included in this training. Refer to CSA Z316.5-15 for further information.

Users must undergo specialized training to learn how to operate fume hoods that deal with special hazards, such as radioisotopes, perchloric acid, etc. The user's supervisor must maintain records of such training.

[Lab Safety Training](#), which is regularly conducted by Health, Safety and Risk Managers, covers the basic concepts and operation of fume hoods. Additional training may be required. The supervisor must ensure that users have been properly trained prior working under a fume hood.

FUME HOOD ALARMS

Many fume hoods are equipped with local, audible alarms that warn the user that the fume hood has not achieved the calibrated face velocity and that the user may be at risk. The alarm must be audible/visible to the user during fume hood use. **DO NOT SILENCE THE ALARM.** The fume hood alarm should have a dedicated user procedure associated with it.

In most cases, if the alarm sounds the sash should be lowered/closed. The fume hood may also have a purge (or "emergency") function that evacuates the interior cabinet. If the alarm persists, keep the hood closed and immediately report the condition to the proper authority (e.g. the supervisor, Facility Manager, Facilities, Protection Services etc.).

PERSONAL PROTECTIVE EQUIPMENT

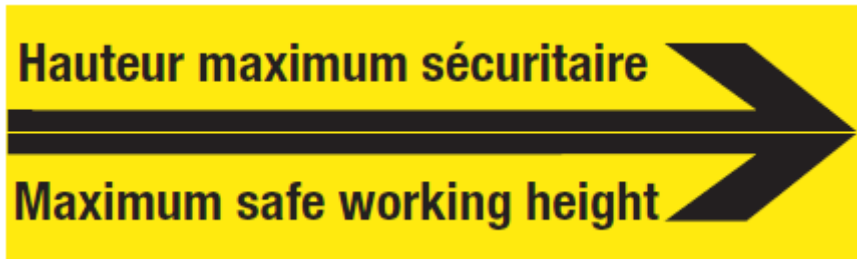
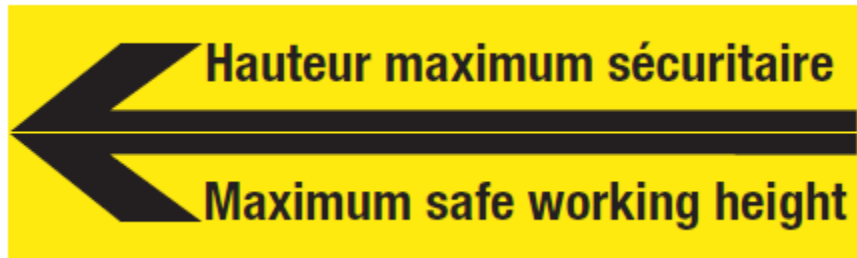
A fume hood is not the only protection required. Lab users are still required to wear personal protective equipment, which may include (and is not limited to):



- Gloves appropriate to the circumstances
- Lab coat or suitable body protection
- Facial protection (e.g. protective eyewear, face shield, etc.)
- Respiratory protection
- Other protection appropriate to the circumstances

The Principal Investigator, Lab Manager, and/or supervisor are responsible for conducting the hazard assessments required for the work. Reasonable control measures must be implemented.

Protective equipment must be properly maintained in accordance with manufacturer guidelines and specifications. Disposable protective equipment must be properly discarded. Refer to [uOttawa Personal Protective Equipment guidelines](#) available from the Office of Risk Management.

APPENDIX 1 – MAXIMUM SAFE WORKING NOTATIONS



	
<p>Aligner la flèche dans les limites jaunes</p> <hr/> <p>Align sash arrow within yellow marking</p>	<p>Garder la baie vitrée fermée lorsque non-utilisée</p> <hr/> <p>Keep sash closed when not in use</p>

APPENDIX 2 – “OUT OF ORDER” SIGNAGE



APPENDIX 3 – RECOMMENDED TOPICS FOR FUME HOOD TRAINING

1. What is a fume hood?
 - a. Types of fume hoods
 - b. Functions of fume hoods
 - c. Basic operating principles
2. What comprises a fume hood?
 - a. Components
 - b. Construction materials
 - c. Make-up and auxiliary air systems
 - d. Exhaust system
3. Uses and limitations of fume hoods
 - a. General laboratory work
 - b. Special uses
 - i. Perchloric acid
 - ii. Radioisotopes
4. Installation locations
5. Maintenance
 - a. Routine
 - b. Preventive
 - c. User maintenance
6. Records and documentation
 - a. Users
 - b. Facilities personnel
7. How to recognize a malfunctioning fume hood
8. Appropriate personal protective equipment
 - a. Eye/face protection
 - b. Respiratory protection
 - c. Gloves
9. Safe operating practices
 - a. On/Off function (if equipped)
 - b. Airflow indicators
 - c. Immediate workspace
 - i. Recessed spaces
 - ii. Heating equipment
 - iii. Use as a storage location prohibited
 - iv. Elevated equipment
 - v. Sash operation levels
10. Alarms (if equipped)
 - a. Procedures for alarms
11. Wash-down systems (if equipped)

APPENDIX 4 – SINGLE-PAGE USER INSTRUCTIONS

FUME HOODS – REMINDERS FOR SAFE OPERATION

This is a **STANDARD FUMEHOOD**. It is **NOT TO BE USED FOR ACID DIGESTIONS!** This document does not constitute training, but is intended to serve as a general reminder for the safe use of the specified hood. If you have questions, speak with your Supervisor and/or Lab Manager.

1. Conduct a pre-use verification of the fumehood. Report any deficiencies immediately and do not use the fumehood.
2. Minimize equipment, products, and materials located within. Fume hoods are not meant for storing material or equipment.
3. Work with the vertical sash at the lowest possible user-operation level. Note the safe operation sticker on the side of the fumehood sash.
4. If the hood is equipped with horizontal sashes, work with the horizontal sash between you and the fumehood.
5. Recess equipment minimum 15-20 cm (6-8 inches) from the fumehood ledge.
6. Raise large, bulky pieces of equipment to permit airflow underneath.
7. Do not obstruct or otherwise block vents or slots.
8. Lower sash (for vertical sashes) or close (for horizontal sashes) when not in use. Fume hoods in ARC should be completely closed when not in use.
9. Avoid cross drafts and the creation of turbulence within the hood.
10. Fume hoods are maintained annually by Facilities. Note the recent date on the inspection sticker. If assistance is required speak with your Supervisor, Lab Manager or Facilities (ext. 2222).
11. Alarms are installed to indicate low face velocity; do not silence.
12. Normal face velocities are 80-120 fpm. You can quickly confirm draw using a Kimwipe® or tissue.
13. Wear required personal protective equipment appropriate for your work.
14. Be prepared to handle any potential spills that may occur.
15. Do not place your head into a fumehood.

FUME HOODS – REMINDERS FOR SAFE OPERATION

This is an **ACID DIGESTION FUMEHOOD**. This is a specially designed hood intended to resist corrosive effects of highly concentrated or heated acids. This document does not constitute training, but is intended to serve as a general reminder for the safe use of the specified hood. If you have questions, speak with your Supervisor and/or Lab Manager.

1. Conduct a pre-use verification of the fumehood. Report any deficiencies immediately and do not use the fumehood.
2. Minimize equipment, products, and materials located within. Fume hoods are not meant for storing material or equipment.
3. Work with the vertical sash at the lowest possible level. Note the safe operation sticker on the side of the fumehood sash.
4. If the hood is equipped with horizontal sashes, work with the horizontal sash between you and the fumehood.
5. Recess equipment minimum 15-20 cm (6-8 inches) from the fumehood ledge.
6. Raise large, bulky pieces of equipment to permit airflow underneath.
7. Do not obstruct or otherwise block vents or slots.
8. Lower sash (for vertical sashes) or close (for horizontal sashes) when not in use. Fume hoods in ARC should be completely closed when not in use.
9. Avoid cross drafts and the creation of turbulence within the hood.
10. Fume hoods are maintained annually by Facilities. Note the recent date on the inspection sticker. If assistance is required, speak with your Supervisor, Lab Manager or Facilities (ext. 2222).
11. Alarms are installed to indicate low face velocity; do not silence.
12. Normal face velocities are 80-120 fpm. You can quickly confirm draw using a Kimwipe® or tissue.
13. Wear required personal protective equipment appropriate for your work.
14. Be prepared to handle any potential spills that may occur.
15. Do not place your head into a fumehood.

LAMINAR FLOW HOOD – REMINDERS FOR SAFE OPERATION

This is a **LAMINAR FLOW HOOD**. This is not an acid digestion or standard fumehood and is intended to **PROTECT THE PRODUCT**, not the individual.

This document does not constitute training, but is intended to serve as a general reminder for the safe use of the specified hood. If you have questions, speak with your Supervisor and/or Lab Manager.

1. Conduct a pre-use verification of the cabinet. Report any deficiencies immediately and do not use the cabinet.
2. Minimize equipment, products, and materials located within. Laminar flow hoods are not meant for storing material or equipment.
3. Recess equipment minimum 15-20 cm (6-8 inches) from the cabinet ledge.
4. Do not obstruct or otherwise restrict the airflow.
5. Laminar flow cabinets are recommended to be certified annually or more frequently if they are relocated or otherwise moved. The certification is done by the Office of Risk Management. If certification is required, contact the Office of Risk Management (ext. 5892).
6. Wear required personal protective equipment appropriate for your work.
7. Be prepared to handle any potential spills that may occur.
8. Perform necessary decontamination procedures (as required).

APPENDIX 6 – FUME HOOD MONITOR

