



Department of Environmental Health and Safety

Subject: Accessing & Servicing Buildings with Potentially Hazardous Exhaust

Date: September 2014

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This Guideline is issued jointly by the Department of Environmental Health and Safety (EHS) and Facilities Management to provide guidance and consistency in the management of the health and safety of workers who have to access the roofs of buildings with potentially hazardous exhaust systems and/or service the interior of hazardous exhaust systems.

SUMMARY: The purpose of this Guideline is to prevent employee and contractor exposure to potentially hazardous materials when performing work involving possible contact with fume hoods and other potentially hazardous exhaust systems.

SCOPE: This Guideline applies to all persons, including contractors, accessing the roofs of buildings with potentially hazardous exhaust systems and/or servicing the interior of hazardous exhaust systems.

REFERENCE DOCUMENTS: The following document provides guidance, rules, and regulations that govern the operation of EHS. When questions arise, EHS is the University authority having responsibility.

- Hazard Communication Standard (29 CFR 1910.1200)

DEFINITIONS: *Biological Safety Cabinet (BSC)* is a special, sometimes exhausted outside the facility, safety enclosure used to handle pathogenic microorganisms in a laboratory.

Building/Departmental Contact is the person empowered by a dean, director, or department head to arrange for and coordinate maintenance and operations activities for a designated facility.

Fume Hood (Chemical Fume Hood) is a ventilated enclosed work space intended to capture, contain and exhaust fumes, vapors, and particulate matter generated inside the enclosure to the outside of a facility.

Environmental Health and Safety (EHS) is the University of Michigan – Dearborn (UM-Dearborn) department that works to maintain a safe and healthy environment. EHS will coordinate and assist in educating faculty, staff and students on standards applicable to University associated



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activities and safety efforts through the University; advise faculty and staff on procedures relating to biosafety and biological safety cabinets; develop accident prevention programs; provide advice; render service; investigate accidents; and maintain statistics related to the environment, health, and safety. Refer to the [EHS website](#) for guidance and educational materials.

Perchlorates are vapors or condensed precipitates of perchloric acid. Vapors can condense while passing through the hood exhaust system forming perchlorates. Dried crystallized perchlorates are shock sensitive and can detonate upon contact during cleaning, modification, or repair of the hood system.

Perchloric Acid is a strong acid that is a powerful oxidizing agent. Perchloric acid must always be used in a designated perchloric acid fume hood that has been specifically designed to minimize the hazards associated with the formation of perchlorates.

Perchloric Acid Fume Hood is a fume hood constructed of noncombustible materials and equipped with a water wash-down system. This system is activated to prevent the formation of perchlorates in the exhaust ducts after using the acid.

Potentially Hazardous Exhaust Systems are any exhaust system used for chemical, radiological, or biohazardous materials. The systems include fume hoods, BSCs, exhaust snorkels, slot hoods, canopies, paint booths, etc. All Solid Red or Striped Red labeled exhaust systems under the Roof Ventilation Plan are considered potentially hazardous.

Radioisotopes/ Radioactive Materials are elements with unstable nuclei that give off energy in the form of ionizing radiation through a process called nuclear decay.

Roof Ventilation Plans contain specific information regarding the equipment, fume hoods, ducted biological safety cabinets, and exhaust fan



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locations on the roof of a specific facility. Roof Ventilations Plans are maintained by Facilities Management.

RESPONSIBILITY: Deans, Directors, and Departmental Heads

- Actively support this guideline within individual units
- Designate a Building or Departmental contact to coordinate shutdowns with Facilities Management. Provide Facilities Management with contact information.
- Take disciplinary action against any person determined to be out of compliance with this Guideline.
- Notify Facilities Management, contractors, and EHS of any known hazards pertaining to the exhaust systems that may pose a hazard to workers.

Supervisors

- Supervisors of employees accessing the roof of buildings with potentially hazardous exhaust systems and/or servicing the interior of hazardous exhaust systems must review the Roof Ventilation Plans and require a shutdown of the affected exhaust systems.
- Determine, according to the Roof Ventilation Plans, exactly which hoods/fans will need a shutdown and which exhaust hoods are affected.
- Notify the Building or Departmental Contact to determine the least disruptive and most efficient shutdown schedule.
- Assure that staff is aware of this Guideline, instructed on the details of implementation, and provided with equipment and controls.
- Report all workplace accidents or injuries and complete [Illness or Injury Report Form](#)
- Contact EHS to request technical assistance.

Employees

- Comply with this Guideline and any further safety recommendations made by your supervisor or EHS.



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- Consult with your supervisor when there are questions regarding health and safety.
- Report any job related injuries or illnesses, questions on health and safety, or unsafe or unhealthy working conditions to your supervisor.
- Contact EHS to evaluate potentially unsafe conditions.

Building and Departmental Contacts

- Work with Facilities Management to determine the least disruptive and most efficient shutdown schedule.
- Notify building occupants of exhaust system/fume hood shutdowns prior to occurrence by posting the designated notices on the exhaust hoods affected and contacting the affected parties via e-mail, telephone, or in person.
- Verify, on the day(s) of work, that the laboratories have complied with all shutdown requirements by conducting site visits to each of the affected locations.
- Notify the dean, director, or departmental head of any personnel not complying with the required shutdown procedures or restrictions.
- Remove all notification signs from fume hoods, doors, elevators, etc. once the project is completed and notify the researchers that they are able to continue normal operation of their laboratory.

EHS

- Review and revise this Accessing & Servicing Potentially Hazardous Exhaust Systems Guideline as needed.
- Provide technical assistance and conduct safety audits when necessary.
- Provide training to UM-Dearborn employees required to access or service potentially hazardous exhaust systems. Training will be conducted as needed and as part of Facilities Management new employee safety orientation and periodically in their annual training.



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Departments Hiring or Coordinating Outside Contractors

- Communicate the potentially hazards present when working within the vicinity of potentially hazardous exhaust systems. Outside contractors will be required to follow this guideline and must be provided a copy by the project manager.
- Comply with all responsibilities listed in the “Supervisors” section of this guideline with the exception that the outside contractor shall provide any personal protective equipment necessary for this project.

PROCEDURES:

Prior to and during accessing and servicing roofs with potentially hazardous exhaust systems, steps shall be taken per this guideline to ensure that personnel are not exposed to chemical, biological or radiological materials. The Building or Departmental Contacts will be notified by Facilities Management and they will in turn, notify all users of the affected exhaust system prior to any shutdown of building systems.

If researchers do not comply with the requirements of an exhaust system shutdown, the work shall not take place until compliance is verified by the Building or Departmental Contact.

When accessing the roof, workers will be advised to remain a fixed distance (20 feet) from any Solid Red Labeled or Unlabeled exhaust stack. Workers who do not need to move closer than 20 feet to the Solid Red Labeled or Unlabeled exhaust stack will be able to access rooftops after coordinating with the Building or Departmental Contact.

Pre-Job Preparation

A. Accessing Roofs with Potentially Hazardous Exhaust Systems

1. Upon receipt of a work order involving work on a roof, the supervisor shall refer to [Appendix A](#) to determine if the work site has a potentially hazardous exhaust system. If the building



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is not listed, the work may proceed following normal work site safety procedures.

2. If the work site is listed as having potentially hazardous exhaust, the supervisor shall refer to the Roof Ventilation Plan, available through Facilities Management to determine if the work site is in an area of the roof which will require fume hoods or other potentially hazardous exhaust systems to be shutdown. If the building does not have a Roof Ventilation Plan, the supervisor shall contact Facilities Management and EHS to assist with the determination.

Work that is not within 20 feet of a Solid Red Labeled or Unlabeled exhaust system and does not require workers to pass through a 20 foot radius of one (as shown on the Roof Ventilation Plan) may proceed with proper notification of the Building or Departmental Contact. The supervisor must caution the workers to avoid hazardous areas.

3. If work within 20 feet of a Solid Red Labeled or Unlabeled exhaust or if workers must pass through a 20 foot radius of Solid Red labeled exhaust as shown on the Roof Ventilation Plan, the supervisor should implement the following:
 - Notify Facilities Management of any work requiring a shutdown and describe the impact on the building occupants (what exhaust systems must be shutdown, and when they will be shutdown, and how long the shutdown will last.)
 - Facilities Management will work with the Supervisor and the Building or Departmental Contacts to determine the least disruptive and most efficient shutdown schedule.
 - The Building or Departmental Contact shall post “Warning! Do Not Use This Hood” ([Appendix C](#)) signs on all affected exhaust hoods, fume hoods, and ducted



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BSCs. Doors to the affected laboratories, corridors, and additional locations may also be posted to increase awareness. This information shall also be communicated by the Building or Department Contact to the affected users via e-mail, telephone, or in person.

4. Required procedures for laboratory personnel or other users to follow are:
 - All chemicals in affected hoods must be removed, capped, or covered.
 - Funnels in chemical containers are not acceptable; funnels must be removed and the containers covered or capped.
 - All equipment, such as hotplates and stirrers, must be turned off.
 - Conducting any experiment in a shutdown fume hood, or using any ducted exhaust system that goes to the shutdown system is prohibited.
 - Failure to comply with these procedures may expose laboratory personnel and maintenance personnel to hazardous materials. Non-compliance with these requirements will result in the work not being completed as planned causing delays in your ability to re-start research, and a report to the appropriate dean, director, or department head for possible disciplinary action.

5. Immediately preceding the start of the scheduled work, the Building or Department Contact or designee shall inspect the impacted exhaust hoods to verify compliance. Any non-compliance shall be addressed by the Building or Department Contact and corrective action taken prior to the work proceeding. If the non-compliance cannot be corrected within a reasonable amount of time, the work shall be rescheduled and



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the department may be billed for the wasted Facilities Management staff time.

6. If a fan shutdown is required, Facilities Management shall determine who will turn the fans off and restart them. Work shall comply with the EHSs [Lock-Out/Tag-Out Guideline](#).
7. If the work will take longer than scheduled, the workers shall notify the Facilities Management Supervisor as soon as possible. Facilities Management shall notify the Building or Departmental Contact to coordinate the extended shutdown with lab users.

B. Servicing the Interior of Potentially Hazardous Exhaust Systems

1. Upon receipt of a work order involving the interior of potentially hazardous exhaust systems, Facilities Management shall schedule a shutdown with the Building or Departmental Contact. The shutdown requests shall include affected exhaust systems, fume hoods, BSCs, other exhaust hoods, and associated fans.
2. The supervisor can refer to the Roof Ventilation Plan, available through Facilities Management, appropriate to the facility to help determine what potentially hazardous exhaust systems are involved and identify the fans or other equipment requiring a shutdown.
3. Once systems identified for a shutdown are determined, Facilities Management shall:
 - Identify in writing the description of the impact on building occupants (what exhaust systems must be



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shut down, when they will be shut down, and how long the shutdown will last).

- Work with the Building or Department Contacts to determine the least disruptive and most efficient shutdown schedule.
4. The Building or Department Contact shall post a “Warning! Do Not Use This Hood” ([Appendix C](#)) signs on all affected exhaust hoods, fume hoods, and ducted BSCs. Doors to the affected laboratories, corridors, and additional locations may also be posted to increase awareness. This information shall also be communicated by the Building or Department Contact to the affected users via e-mail, telephone, or in person.
 5. Laboratory personnel or other users are required to adhere to the following steps to prepare for a shutdown. Failure to comply with this procedure may expose laboratory personnel and maintenance personnel to hazardous materials. Non-compliance with these requirements will result in the work not being completed as planned, causing delays in your abilities to re-start research, and a report to the appropriate dean, director, or department head for possible disciplinary action.
 - Do not use or conduct any experiments in a fume hood or exhaust system that connects to the shut down system.
 - Remove, cap, or cover all chemicals in affected hoods.
 - Remove funnels and cap chemical containers in affected hoods.
 - Turn off all equipment, such as hotplates and stirrers.
 - Clean the interior surfaces of the hood if workers will need to enter or contact the interior surfaces.



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6. Immediately preceding the start of the scheduled work, the Building or Department Contact or designee shall inspect the impacted exhaust hoods to verify compliance. Any non-compliance shall be addressed by the Building or Department Contact and corrective action taken prior to the work proceeding. If the non-compliance cannot be corrected within a reasonable period of time, the work shall be rescheduled and the department may be billed for wasted Facilities Management staff time.
7. If a fan shutdown is required, Facilities Management shall determine who will turn the fans off and restart them. Work shall comply with EHSs [Lock-Out/Tag-Out Guideline](#).
8. If the work will take longer than scheduled, the workers shall notify the Facilities Management Supervisor as soon as possible. Facilities Management shall notify the Building or Departmental Contact to coordinate the extended shutdown with lab users.

Personal Protective Equipment

1. Personal protective equipment shall be worn during work on all fume hoods and other potentially hazardous exhaust systems. Protective equipment shall be provided to the workers by their supervisor. The goal is to prevent skin contact with the interior surfaces of these systems. The minimum protective equipment required if unusual circumstances or hazards are identified. Contact EHS if you have any questions.
 - Gloves – Disposable latex, vinyl, or nitrile gloves shall be worn under a leather palmed glove. Additional acid or solvent resistant gloves may be required if unusual circumstances or hazards are identified. Contact EHS if you have any questions.



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- Safety Glasses or Goggles – shall be worn when contact with the inside of a potentially hazardous exhaust system is likely.
- Respiratory Protection – typically not required unless work on a potentially hazardous exhaust system involves the potential for exposure to contaminated dust and for exposure to residual chemicals. Contact EHS for information on the appropriate respirator cartridges.

Post Completion of Work

1. All locks and tags shall be removed from all locked-out/tagged-out equipment.
2. All locked-out/tagged-out equipment shall be put back in operation. Proper operation of said equipment shall be verified.
3. The workers shall notify Facilities Management upon completion of the work. Facilities Management shall report the project completion to the appropriate Building or Departmental Contacts.
4. All notices and tags posted on exhaust hoods, fume hoods, laboratory doors, entry doors, elevators, etc. shall be removed by the Building or Department Contacts.
5. The Building or Department Contacts shall notify the researchers of the project completion and give the approval to resume normal operations of the systems.

Fume Hoods Which Must Remain Operational

When the Facilities Management Supervisor schedules a fume hood shutdown, the Building or Departmental Contact shall inform the coordinator if operation of a fume hood or exhaust system



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cannot be interrupted. The Facilities Management Supervisor and/or building contact shall contact EHS to determine if, and under what conditions, the work on the exhaust system can proceed.

1. These projects will not be a routine occurrence, and will be investigated on a case by case basis.
2. EHS will develop a case specific written procedure for experiments allowed to continue while the work is performed. In nearly all circumstances experiments will stop or be moved to an area not affected by the shut down.
3. The Building or Department Contact shall post the procedure on each affected hood system and ensure all restrictions outline in the procedure are relayed to the researcher and are being adhered to during the maintenance period.
4. If it is determined the work cannot proceed with the experiment in progress, the experiment shall be relocated or the work shall not be performed until the experiment has been completed.
5. The Building or Departmental Contact shall conduct weekly walk-through inspections during long term projects to verify compliance with the use restrictions.
6. Non-compliance with the user restrictions shall result in affected hoods being completely shutdown for the duration of the project and a report provided to the appropriate dean, director, or department head for possible disciplinary action taken against the users.



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TECHNICAL SUPPORT: All referenced guideline, regulations, and other documents are available through Facility Operations Call Center (593-5270) or on the EHS website (www.umd.umich.edu/EHS)

ATTACHMENTS: [Appendix A](#) Buildings with Fume Hoods
[Appendix B](#) Rooftop Exhaust Hazards Identification
[Appendix C](#) “Warning! – Do Not Use This Hood” Sign

Appendix A
Buildings with Fume Hoods

Building Name	Acronym
College of Arts, Sciences, and Letters	CASL
Computer Wing	CW
Engineering Lab Building	ELB
Science Learning and Research Center	SLRC
Science Building	SB

[Campus Map](#)

Appendix B

Rooftop Exhaust Hazard Identification

All exhaust systems on a roof with potentially hazardous exhaust will be identified with one of three designations: green/white stripes, red/white stripes, or solid red. A legend will be posted on all roof access points based on the description below:

Green and White Diagonal Stripes: Safe to approach and safe to work on system at any time. No hazardous constituents exhausted. An example would be general building exhaust.

Red and White Diagonal Stripes: Potentially hazardous exhaust system meeting minimum safety engineering requirements. Exhaust systems meeting these requirements have sufficient exhaust stack height and velocity to eject potential hazardous outside of the building envelope. These systems are safe to approach and work around. Actual work on the system or over the exhaust stream will require a shutdown and compliance with this EHS Guideline.

Typically, Strobic-type fan systems will be identified as Red and White Diagonal Stripes. These systems meet or exceed the minimum effluent flow standards established by OSEH/EHS. The minimum standard for any exhaust labeled Red/White stripes is that the physical stack height be no less than 10 feet high, the exit velocity from the stack is not less than 3,000 fpm, and the system is equipped with a bleed-in damper to supply make-up air. The bleed-in damper will ensure a constant stack exit velocity regardless of hood sash heights, filter loading, or anything else that would normally reduce flow from a stack.

Solid Red Labeled or Unlabeled Exhaust: Potentially hazardous exhaust system that must be shutdown in order to approach within 20 feet of the exhaust stack. By default, all chemical fume hoods that are NOT part of a Strobic-type system will be designated as Solid Red/Unlabeled exhaust regardless of what hazardous materials are in use.

WARNING!

**DO NOT USE THIS HOOD
THIS HOOD IS TEMPORARILY OUT OF
SERVICE DUE TO SCHEDULED WORK**

DATES OF SHUTDOWN _____

BUILDING CONTACT: NAME: _____ **PHONE:** _____

- Use of this exhaust hood is prohibited until this warning notice has been removed.
- All containers of chemicals shall be capped or covered. Leaving funnels in the containers is not acceptable. All experimental equipment shall be turned off.
- This applies even if the exhaust fan is operating: people may be working on the fume hood exhaust system.
- Use of this fume hood while it is tagged out of service may expose you and others to hazardous materials.
- Failure to comply with the above is considered non-compliance and will be referred to your dean, director or department head for disciplinary action.

Contact the Facilities Management at 3-5270 or your Building or Department Contact for additional shutdown information.