

Entering Laboratory Exhaust Systems

Standard Operating Guidelines

Background

Physical Plant employees and contractors must, at times, enter the air plenums that serve the general and fume hood exhaust systems for UVM laboratories. In addition to confined space, lock-out tag-out and ergonomic hazards that need to be evaluated, there is the potential for exposure to chemicals that are transported from the laboratories through this system. These guidelines describe the risk and control of those potential exposures.

Risk

Laboratories use small amounts of a wide variety of chemicals. Some of these chemicals may be volatilized or aerosolized and exhausted through the ventilation system along with a huge amount of air that effectively dilutes the chemical concentration. Some of these chemicals may pose a hazard even in small concentrations (such as carcinogens) and so exposure must be reduced to the lowest feasible concentration.

Routes of Entry:

Inhalation is the Route of Entry of main concern. In these systems, there are two predominant types of material that can be inhaled.

1. Particulates that have been deposited in the system may become airborne by the activity of the worker.
2. Volatile materials used by laboratory workers during the time when personnel are within the exhaust system.

Absorption, Ingestion and Injection of chemicals in these situations are best controlled through:

- Proper hand washing;
- Changing and laundering work clothes;
- Avoiding eating drinking, chewing gum or smoking during these work activities; and
- Wearing gloves and shoes that protect from cuts.

Control

Isolate the hazard: When possible, the exhaust fans should be shut down prior to entry and lab work should cease; this is advised in all laboratory buildings and required in the Delehanty Building. Advance notification (at least two weeks if possible) must be made to appropriate Department Chair, Dean's Office and/or laboratory personnel. Applicable Lock-out Tag-out procedures need to be followed. This reduces the potential for exposure from chemicals being used in the laboratory hood and not from particulates already deposited in the exhaust system.

Reduce the exposure: When fan shut down is not possible, work inside these plenums should be scheduled during periods of low laboratory activity. This reduces the potential for exposure from chemicals being used in the laboratory hood and not from particulates already deposited in the exhaust system.

Personal Protective Equipment: Personnel entering the exhaust air plenums must wear personal protective equipment (PPE). The contaminants of concern are either particulates (includes dusts, microbes, and metal fumes) or organic solvent vapors.

Recommended PPE

- Full-face, air-purifying respirators with organic cartridges and HEPA pre-filters are required for work in operational systems due to the potential for laboratories to introduce contaminants into the system.
- Disposable particulate respirators (N95 or greater) are required for those systems where the potential chemical hazard from laboratories has been isolated.
- Disposable Coveralls – non-chemical coated tyvek (i.e. “white”) is acceptable during “dry” conditions. If the work involves pressure washing then an additional rain suit and rubber boots should be worn; alternatively a water resistant tyvek suit may be worn. PPE recommendations may need to be reconsidered to account for additional hazards associated with other anticipated work conditions, such as welding.
- Tear resistant, disposable gloves - neoprene, nitrile, PVC are acceptable; and
- Chemical resistant footwear (i.e. leather that can be brushed clean) or tyvek booties.

NOTE: hardhats and steel toe/shank boots may be required due to other hazards.

Monitoring: Personnel will check the air using a “4-gas meter” prior to, and during, work activities within the exhaust system. Changes in the combustible gas level especially, as well as the other levels, could indicate hazardous materials use in the laboratory the feeds into the exhaust system.

Decontamination: All PPE, tools and filters need to be kept within a “hot zone” or containment zone, until they have been decontaminated or sealed in a plastic bag for disposal. Personnel must wash hands and other exposed areas (face, arms) after doffing PPE and leaving the containment zone.

Disposal

PPE: PPE should be decontaminated and appropriately doffed so as to avoid spreading dusts to skin or other areas in the building. PPE can be disposed instead of decontaminated, by placing in a plastic bag and sealing with duct tape. Dispose of PPE through the ESF hazardous waste system.

Filters: Filters should be placed in plastic bags and sealed to avoid spreading dusts to personnel or other areas in the building. A sample of the exhaust filters needs to be taken and analyzed prior to disposal; ESF personnel will coordinate this when filter change-out is due.

Vacuuming: If the work includes vacuuming inside the exhaust system, then a HEPA vacuum should be used. When the HEPA filter needs to be disposed, personnel need to wear respiratory protection and work in ventilated area. Dispose of HEPA filter from vacuum by sealing it in a plastic bag and disposing as hazardous waste. Personnel must wash hands following working with these filters.

Ductwork: Dismantled ductwork can be disposed through scrap metal. Ends of ductwork must be wrapped in plastic if being transported through occupied portions of the building.

Special Considerations

Fumehood Cabinets: Laboratory personnel must empty the fume hood and wash down the work surfaces before maintenance/demolition work can proceed. Check with Physical Plant regarding asbestos containing material (ACM) prior to scheduling work. Non-ACM fumehood pieces can be scrapped.

Perchloric Acid Hoods: Only those exhaust systems with a known history of perchloric acid digestions, involving boiling perchloric acid, require steam cleaning prior to work.