CHAPTER 27 – VENTILATION FOR HEALTH HAZARD CONTROL

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A. INTRODUCTION

1. It is the policy of the Smithsonian Institution (SI) to protect employees from the inhalation health hazards of airborne pollutants by first implementing engineering controls. If engineering controls are not feasible, or while controls are being installed or repaired, administrative controls and/or personal protective equipment (PPE) shall be used.

2. This Chapter applies to all SI facilities and establishes criteria for the effective use of mechanical ventilation systems to mitigate inhalation hazards at their source, and the investigation and mitigation of indoor air quality concerns.

3. Design and operation of ventilation systems for health hazard control shall conform to the latest edition of regulatory standards promulgated by the Occupational Safety and Health Administration (OSHA), the Industrial Ventilation – A *Manual* of Recommended Practice for Design of the American Conference of Governmental Industrial Hygienists (ACGIH) and other applicable consensus standards referenced in this Chapter.

B. CHAPTER-SPECIFIC ROLES AND RESPONSIBILITIES

1. Safety Coordinators shall:

   a. Ensure ventilation controls that are installed for health hazard control are operating properly, in accordance with the criteria established by this Chapter and based on results of OSHEM assessments.

   b. Coordinate assessments of mechanical ventilation system performance and/or indoor air quality with other responsible offices, such as Office of Engineering Design and Construction (OEDC), Office of Facility Management and Reliability (OFMR), resident Building Manager (particularly in buildings without assigned OFMR staff) and Office of Safety, Health and Environmental Management (OSHEM).

   c. Conduct an initial investigation of employee complaints related to indoor air quality or ventilation deficiencies.

2. Supervisors shall:

    a. Notify the Safety Coordinator, and OSHEM of operations that generate airborne inhalation hazards, so that an assessment of employee exposure and ventilation requirements can be made.

    b. Ensure that ventilation systems used for health hazard control are operating properly and that employees are trained in their use and the signs of system failure.

    c. Notify the Safety Coordinator, OSHEM, OFMR or resident Building Manager if exhaust ventilation systems are suspected of not effectively removing contaminants or are inoperable. In the interim, stop all work activities that require the use of the ventilation system and tag the system out of service.

    d. Ensure employees are trained in the use of required PPE, and use PPE while control ventilation is being repaired, designed, or installed.

    e. Request exhaust hood certification from OSHEM following hood failures, repairs or modifications.

    f. Notify the Safety Coordinator of any changes in the workplace operations that may adversely affect the current indoor environment (e.g., painting, pesticides, use of chemicals, cleaning), so that an evaluation can be made.

    g. Document staff complaints, employee symptoms, and location of complaints resulting from suspected indoor air quality concerns.

3. Employees shall:

    a. Operate ventilation systems properly, as trained.

    b. Notify their supervisor if an exhaust system does not appear to be operating effectively or is inoperable.

    c. Notify supervisors when there is an indoor air quality concern or when they experience symptoms they believe may be caused by their work environment.

    d. Use approved PPE as required when HVAC and exhaust systems are shut down for maintenance and/or repair.

4. Office of Facilities Management and Reliability (OFMR) or resident Building Manager in buildings without assigned OFMR staff shall:

    a. Establish, implement, and document a regular preventive maintenance and inspection program and procedures for ventilation and HVAC systems based on applicable standards in keeping with the principles of reliability centered maintenance (RCM). Maintain all operations, maintenance, and calibration records for HVAC system components (e.g., fans, dampers, filters, chillers, boilers, and control systems) within the building maintenance office and in the OFMR Facility Center, as applicable. Keep a record of all components that need to be repaired, adjusted, or replaced.

    b. Conduct inspections and repair all mechanical ventilation systems to ensure proper system operation and equipment condition.

    c. Submit to OSHEM all plans, specifications, and drawings for in-house work orders that involve installation or alteration of ventilation equipment, or involve modification of spaces in a manner that would substantially change air flow.

    d. Ensure the implementation of recommended operations and maintenance control measures to correct identified indoor air quality issue(s), and HVAC or exhaust system deficiencies.

    e. Notify Safety Coordinator, supervisors and affected staff of mechanical ventilation system shutdowns that will affect their work operations. Schedule routine HVAC maintenance shutdowns after hours, when feasible.

    f. Notify the Safety Coordinator and supervisors prior to any change in workplace operations that may effect the current indoor environment.

    g. Notify the Safety Coordinator and OSHEM of suspected poor indoor air quality trends, such as repeat HVAC service calls or occupant complaints.

    h. Conduct or assist in IAQ evaluations to assess suspected issues with mechanical ventilation equipment.

5. Office of Engineering Design and Construction (OEDC) shall:

    a. Provide technical assistance to OFMR, the resident Building Manager and OSHEM in carrying out their ventilation system and IAQ responsibilities, including:

        (1) Provide mechanical ventilation system design criteria;

        (2) Submit results of contractor's system studies and balance reports;

        (3) Provide information on required mechanical ventilation system specifications; and

        (4) Notify the Safety Coordinator, the OFMR or resident Building Manager Manager, and OSHEM of upcoming projects that may adversely affect a ventilation system used for health hazard control.

    b. Review design, construction, and operating documents for all current and future building construction operations to ensure standards for maintaining acceptable indoor air quality are met.

    c. For mechanical system design, ensure that the planned operations and activities to be conducted in a facility match the design criteria necessary for the intended use.

    d. Submit to OSHEM all plans, specifications, and drawings for contract work orders that involve installation or alteration of ventilation equipment, or involve modification of spaces in a manner that would change air flow in the spaces.

    e. Serve as the commissioning agent for all SI installed fume hoods, general mechanical ventilation systems, and exhaust systems.

6. Office of Safety, Health and Environmental Management (OSHEM) shall:

    a. Evaluate the effectiveness of ventilation systems designated to control employee exposure to harmful airborne contaminants.

    b. Coordinate with OFMR, the resident Building Manager, and the Safety Coordinator, to evaluate and identify conditions that may adversely affect indoor air quality, and recommend corrective actions.

    c. Review and provide comment on construction, renovation, and demand work orders submitted by OFMR, the resident Building Manager and

OEDC that impact the effectiveness of ventilation systems in controlling contaminants, fire hazards, and explosion hazards.

d. Conduct medical consultations, interviews, and examinations of employees identified as potentially exposed to or reporting symptoms of, poor indoor air quality.

7. OFEO Real Estate Division shall: Coordinate with the lessor to abate indoor air quality deficiencies identified within SI Leased Properties following recommendations established by OFMR, OSHEM, and the Safety Coordinator.

C. HAZARD IDENTIFICATION

1. Hazards from Work Processes

a. Processes that generate dusts, mists, vapors, and gases without engineering controls must be evaluated by supervisors with assistance from Safety Coordinators/ OSHEM to determine if engineering controls are necessary. This action is to be completed as part of the job hazard analysis (JHA). JHAs are to be completed using the outline available in Chapter 4 "Safety Risk Management Program", of this Manual.

b. The following factors should be considered when determining if a process requires the implementation of specific ventilation rates or devices, and if so what type of system is to be implemented. The Safety Coordinator and OSHEM shall be consulted and involved in this determination.

(1) The toxicity and physical state of the process chemicals (gas, liquid, solid). (This information may be available on the material safety data sheet).

(2) Whether or not employees are exposed during the process, and the location of the employees. If employees are exposed, an exposure assessment shall be completed by OSHEM in accordance with Chapter 39, "Exposure Assessment and Medical Surveillance", of this *Manual*.

(3) If the process creates a dust or mist, the velocity with which these particles are generated and the air velocity currents in the room.

(4) The vapor pressure/ evaporation rate of a chemical. (This information is available on the material safety data sheet).

(5) The frequency with which the process is used, and the level of production.

2. Indoor Air Quality Complaints/Concerns

a. The Safety Coordinator, with assistance from OFMR, the resident Building Manager and OSHEM, shall adopt a systematic approach to promptly investigate and resolve indoor air quality concerns. The basic outline for conducting an IAQ investigation can be found in Building Air Quality, A Guide for Building Owners and Facility Managers.

b. The process for addressing the complaint is as follows:

(1) Once an employee submits an oral or written complaint related to indoor air quality to their supervisor, the supervisor shall request the Safety Coordinator to conduct a preliminary investigation. Information regarding symptoms, work activities, and the location shall be documented by the Safety Coordinator and forwarded to the OSHEM Occupational Health Services Division.

(2) The supervisor will also schedule an employee appointment with the Occupational Health Services for medical consultation (if necessary or requested by the employee) when a complaint has been submitted.

(3) The Safety Coordinator shall request OFMR or the resident Building Manager to assess the environmental conditions (e.g., temperature, humidity, and air flow) in the complaint/concern area. OFMR shall ensure environmental conditions meet ANSI/ASHRAE Standard 62.1-2010. This information shall be communicated to the Safety Coordinator and OSHEM.

(4) The Safety Coordinator shall request that OSHEM perform an evaluation (as necessary) of the complaint/concern area to identify potential causal factors. This step may be in conjunction with or soon after OFMR or the resident Building Manager provides results of their mechanical ventilation assessment.

(5) If the source of the complaint/concern has been identified, OSHEM will recommend control measures to eliminate or minimize the identified ventilation deficiency or substandard environmental condition to OFMR or the resident Building Manager. The affected facility will be notified of the results of the indoor air quality complaint/concern investigation.

D. HAZARD CONTROL

1. General Requirements

   a. Local exhaust ventilation shall be the primary method for controlling toxic or noxious substances at the source of generation and before they can enter the environment to pose a potential health hazard to employees.

   b. General (dilution) ventilation is primarily used to control employee comfort (for example, temperature and humidity). Dilution ventilation may be used to reduce airborne concentrations of contaminants of low toxicity when they are generated at relatively low rates from diffuse sources. Dilution ventilation rates shall be determined using ANSI/ASHRAE Standard 62.1-2010

   c. Visual/audible alarms shall be present in all areas where highly hazardous materials are used or may be present to notify occupants of leaks or malfunctions (e.g., laboratory hoods, chiller rooms/ control rooms - where refrigerants are stored or used). Laboratory hood alarms are to be set at 80% of the designed airflow and are to be calibrated annually. Other system alarms shall be set as specified by the manufacturer or commissioning agent.

   d. All general or local exhaust ventilation designed and installed for health-hazard control first must be reviewed and approved by OSHEM prior to use.

   e. Canopy hoods shall never be used to control toxic, radioactive, or explosive materials, since they could pull contaminants through a workers breathing zone and cause illness or injury.

   f. Radioisotope work is to be conducted in fume hoods identified to this purpose and under work conditions specifically approved through the OSHEM Radiation Protection Program and applicable Nuclear Regulatory Commission license provisions.

   g. After recommended ventilation controls have been installed, an evaluation (testing and air balance report/ system commissioning report) of the system's effectiveness and operating efficiency shall be maintained by the facility (Safety Coordinator and resident Building Manager).

   h. The presence of standing water within ventilation systems amplifies the growth of microorganisms and may be associated with increased indoor air quality problems. If standing water is identified within ventilation systems, it must be promptly abated.

i. Accumulated debris (e.g., bird waste, visible mold, leaves, etc.,) must be promptly removed from all outdoor air intakes to minimize the risk of entraining outdoor contaminants into the building air supply.

2. Ventilation Design Requirements for Specific Processes. For certain processes, federal regulations mandate defined ventilation system designs, and/ or minimum ventilation rates. Some of these process specific requirements are detailed in Attachment 1. The Safety Coordinator and OSHEM should be consulted for processes that are not listed, but may generate uncontrolled airborne contaminants.

3. Preventative Maintenance and Evaluation

   a. A Preventative Maintenance program shall be implemented by OFMR or the resident Building Manager to ensure that building mechanical systems are operating at peak performance and according to manufacturer's specifications.

   b. When a system failure occurs, preventive maintenance will be done. OFMR or the resident Building Manager shall coordinate scheduled and unscheduled repairs with users to ensure alternate protection is taken until repairs can be completed.

   c. During a system failure, all affected hoods or exhaust systems are to be posted as out of service. A sample out of service sign is provided in Attachment 2.

4. Decommissioning: Ventilation systems that are contaminated with substances that are potentially harmful, must be decommissioned prior to a change of use, renovation, or demolition. Processes and procedures outlined in Chapter 26 Laboratory Safety Section G and ANSI/AIHA Z9.11 are to be utilized. .

E. TRAINING

1. Employees performing HVAC maintenance need operational training for the system. Preventive maintenance training needs to be provided by the contractor to HVAC Engineers prior to system start-up. Requirements for this training shall be included in the contractual documents.

2. Employees using LEV systems to control their exposure to a health hazard, need to be trained to use the system to reduce their exposure. Attachment 3, "Practical Tips to Working Safely in a Fume Hood", shall be used in the training and posted in the LEV work area.

3. Employees need training on emergency precautions if the system becomes inoperable, and precautions to protect themselves in the event of a system failure. Training must meet the specific requirements detailed in Chapter 25, "Chemical Hazard Communication", of this *Manual*.

4. In the event of an LEV failure, if safe to do so, turn off all reactions under the hood, close the sash or damper, notify supervision and leave the area, closing the door behind if appropriate.

F. REQUIRED INSPECTIONS AND SELF ASSESSMENT

1. OFMR or the resident Building Manager shall conduct inspections of all mechanical ventilation systems to ensure proper systems operations and equipment condition. HVAC system inspections shall be performed in accordance with the requirements outlined in Chapter 35, "Fire Systems Inspection, Testing, and Maintenance (ITM)", Attachment 14, of this *Manual*.

2. OEDC shall inspect newly constructed ventilation systems, prior to system turnover, to ensure that systems are constructed, installed, and operate according to specifications. Commissioning testing shall be completed using the methods outlined in ANSI/ASHRAE 110 or an equivalent method.

3. Ventilation systems scheduled for renovation shall be assessed and decommissioned in accordance with ANSI Z9.11-2008.

4. OSHEM shall conduct annual testing of exhaust ventilation systems designed for health hazard control to ensure that adequate exhaust velocity is provided to capture and contain hazardous chemicals.

5. Biological safety cabinets require a more extensive certification of the effectiveness of the internal filtration, in accordance with National Sanitation Foundation (NSF)/ American National Standards Institute (ANSI) 49, and are to be inspected and certified annually by an accredited Biological Cabinet Field Certifier. A list of NSF 49 accredited Biological Cabinet Field Certifiers can be found on the NSF website, **http://www.nsf.org/Certified/Biosafety-Certifier/.**

G. RECORDS AND REPORTS

1. OFMR or the resident Building Manager shall maintain all operations, maintenance, testing and balancing reports, and calibration records for HVAC

system components (e.g., fans, dampers, filters, chillers, boilers, and control systems) within the facility maintenance office.

2. OFMR or the resident Building Manager and OEDC shall maintain all As-built drawings and commissioning reports.

H. REFERENCES

1. American Conference of Governmental Industrial Hygienists (ACGIH): Industrial Ventilation – A *Manual* of Recommended Practice for Design (latest edition).

2. ACGIH, "Threshold Limit Values and Biological Exposure Indices", current edition:

3. American Industrial Hygiene Association (AIHA). Recognition, Evaluation, and Control of Indoor Mold. Fairfax, Va. 2008.

4. American National Standards Institute (ANSI)/ American Industrial Hygiene Association (AIHA)

    a. Z9.1-2006 Open-Surface Tanks – Ventilation and Operation

    b. Z9.2-2007 Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

    c. Z9.3-2007 Spray Finishing Operations - Safety Code for Design, Construction, and Ventilation

    d. Z9.5-2003: Laboratory Ventilation.

    e. Z9.6-2008 Exhaust Systems for Grinding, Buffing and Polishing

    f. Z9.7-2007 Recirculation of Air from Industrial Process Exhaust Systems

    g. Z9.9-2010 Portable Ventilation Systems

    h. Z9.10-2008 Fundamentals Governing the Design and Operation of Dilution Ventilation Systems in Industrial Occupancies

    i. Z9.11-2008 Laboratory Decommissioning

5. ANSI/ American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE)

    a. Standard 15-2007, Safety Standard for Refrigeration Systems

    b. Standard 34-2007, Designation and Safety Classification of Refrigerants

    c. Standard 55-2004, Thermal Environmental Conditions for Human Occupancy.

    d. Standard 62.1-2010, Ventilation for Acceptable Indoor Air Quality.

    e. Standard 62.2-2010, Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings.

    f. Standard 110: Method of Testing Performance of Laboratory Fume Hoods:

6. CDC. Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition:

7. EPA/400/1-91/033, Building Air Quality, A Guide for Building Owners and Facility Managers:

8. Kodak. Indoor Air Quality and Ventilation in Photographic Processing Facilities.

9. National Fire Protection Association (NFPA):

    a. NFPA 45: Standard on Fire Protection for Laboratories Using Chemicals

    b. NFPA 90A: Standard for the Installation of Air-Conditioning and Ventilating Systems.

    c. NFPA 91: Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids

10. NSF/ANSI 49-2010: Biosafety Cabinetry: Design, Construction, Performance, and Field Certification

11. Occupational Safety and Health Administration (OSHA) General Industry Standards (29 CFR 1910) and Construction Standards (29 CFR 1926):

    a. 29 CFR 1926:

b. 1910.94, Ventilation (including Abrasive Blasting 1910.94(a), Grinding Operations 1910.94b, and Open Tanks 1910.94(d)):

c. 1910.106, Flammable & Combustible Liquids:

d. 1910.107, Spray Booths:

e. 1910.108, Dip Tanks:

f. 1910.178, Powered Industrial Trucks:

g. 1910.252, Welding, Cutting & Brazing:

h. 1910.1000, Air Contaminants:

12. OSHA. Safety and Health Information Bulletin SHIB 03-10-10. A Brief Guide to Mold in the Workplace. http://www.osha.gov/dts/shib/shib101003.html

Attachment 1

Process Specific Ventilation Design Requirements

Operation	Recommended Exhaust System	General Guidelines	References
Spray Painting	Paint Spray Booth	OSHA requires spray painting operations to have a minimum average air velocity of 100 fpm over the open face of the booth (electrostatic spraying is exempt). OSHA makes other requirements for construction materials, interior surface and floor design, design of baffle plates, cleaning, and the separation from other operations. A visible gauge shall be used to indicate the velocity being maintained in the booth. The booth shall also be equipped with an audible alarm to warn users of insufficient velocity rates. References must be consulted for additional design guidance.	29CFR 1910.107, Spray Booths: 29CFR 1910.94c, ACGIH Industrial Ventilation ANSI/AIHA Z9.3-2007 ANSI/ASHRAE 62.1-2010 Chapter 21, “Paint Spray Operations” NFPA 91
Welding	Local Exhaust Ventilation (LEV)	OSHA requires 100 feet per minute (fpm) in the zone of welding for a local exhaust hood. Other requirements exist for fixed enclosure welding and confined space welding. The minimum distance that shall be maintained between the welding zone and the face of the hood is 6 inches. Recommended designs are described for a movable exhaust hood, bench hood, and production level welding in the referenced ACGIH *Manual*. Welding curtains shall be used to block cross drafts, but should not restrict exhaust ventilation.	29CFR 1910.252 ACGIH Industrial Ventilation Chapter 14, “Hot Work Management and permit System”

Operation	Recommended Exhaust System	General Guidelines	References
Abrasive Blasting	LEV	Blast cleaning enclosures shall be kept negative pressure to the surrounding areas through the use of exhaust ventilation during blasting. The exhausted air must be discharged through dust collecting equipment. ACGIH has recommended designs for blasting cabinets and blasting room.	29CFR 1910.94(a) ACGIH Industrial Ventilation
Plating, Cleaning and Treatment Tanks	LEV	Recommended ventilation rates are dependent on a number of parameters, which include the hazard potential of the material, tank configuration and location, and the type of ventilation system.	ACGIH: Industrial Ventilation ANSI/AIHA Z9.1-2006
Grinding	LEV	OSHA requires grinding wheels, buffing and polishing wheels, grinding belts and other grinders to have local exhaust ventilation when employee exposures exceed established limits (29CFR 1910.1000). Exhaust ventilation must meet minimum requirements (29CFR 1910.94(b)). Recommended LEV specifications have been developed by the ACGIH.	29CFR 1910.94(b) 29CFR 1910.1000 ACGIH Industrial Ventilation ANSI/AIHA Z9.6-2008 Chapter 11, "Machinery, Machine Guarding, and Hand and Portable Powered Tools"
Wood Working	LEV	Recommended hood systems are described in the referenced ACGIH *Manual*. LEV systems need to be designed with a clean-out door to enable the removal of wood dust. Duct velocities should be maintained at a minimum of 3500 fpm to prevent the settling and clogging of the duct.	ACGIH Industrial Ventilation

Operation	Recommended Exhaust System	General Guidelines	References
Laboratory (animal, and biological operations – see additional information below)	LEV (Chemical fume hood, glove box, or capture hood)	Where operations can cause excessive employee exposures, LEV (chemical fume hood, glove box, capture hood) shall be used. The laboratory hood selected must provide an adequate face velocity to capture and contain hazardous chemicals. Design guidelines are provided in the referenced ANSI/AIHA standard and ACGIH *Manual*. Some design elements that must be considered include; construction materials, flow monitoring devices, hood location, sash type, use patterns, utilities needed, ductwork, air cleaning, decontamination, and alarms.	SI Laboratory *Safety Manual* ACGIH Industrial Ventilation ANSI/AIHA Z9.5-2003
	General Mechanical Ventilation (GMV)	OSHA recommends general mechanical ventilation sufficient to ensure that laboratory air is continually replaced, and that airflow is directed into the laboratory from non-laboratory areas.	ANSI/AIHA Z9.5-2003 29CFR 1910.1450
Laboratory - Biological/ Animal	LEV (Biological safety cabinets, enclosures) GMV	The selection of appropriate engineering controls is dependent on a risk assessment of the agents and activities used in the laboratory. Facilities must be designed with containment in consideration. Specifications for the design and installation of biological safety cabinets can be found in the referenced documents.	ACGIH Industrial Ventilation ANSI/AIHA Z9.5-2003. CDC. Biosafety in Microbiological and Biomedical Laboratories CDC/NIH. Primary Containment for Biohazards

Operation	Recommended Exhaust System	General Guidelines	References
Flammable/ Combustible Chemical Storage	GMV	OSHA has established ventilation requirements to prevent fire and explosions, 29CFR 1910.106. For inside storage areas, room exhaust ventilation must be sufficient to provide six air changes per hour, under negative pressure, by a mechanical or gravity exhaust system. If employee health is an issue, additional exhaust ventilation must be used.	29CFR 1910.106 29CFR 1910.1000 ACGIH Industrial Ventilation NFPA 30
Photo Processing	LEV/ GMV	For open tray processing, a local exhaust ventilation system shall be operated to provide 75 fpm air velocity above the furthermost edge of the trays. When local exhaust ventilation is absent, general (dilution) ventilation shall be maintained at a minimum of 10 air changes per hour, under negative room pressure, and shall be sufficient to reduce air contaminants to an acceptable user level. A supply and return system must exist in each area that is partitioned off as a separate room. For automated processing, local exhaust ventilation shall be provided in accordance with the manufacturer's recommendations. General (dilution) ventilation shall be maintained at a minimum of four air changes per hour, negative room pressure.	ANSI/ASHRAE 62.1-2010 Kodak J-314

Operation	Recommended Exhaust System	General Guidelines	References
Toxic and flammable gases	LEV	Toxic and flammable gases such as arsine, phosphine, silane, hydrogen chloride, ammonia, hydrogen phosgene, selenide, and nickel carbonyl, should be used in an approved gas storage cabinet, equipped with monitoring devices and failure alarms, and vented through a scrubbing system. OSHEM is to be consulted on these installations.	SI Laboratory Safety Manual
Perchloric acid	LEV	Use of perchloric acid, particularly fuming, must be conducted in a specially-designed perchloric acid wash-down hood. Certain uses of perchloric acid may not require this type of hood but will require special controls within an LEV. OSHEM MUST be contacted for proper exhaust ventilation use with perchloric acid.	ACGIH Industrial Ventilation ANSI/AIHA Z9.5-2003 NFPA 45
Photocopying Equipment	GMV	Dilution ventilation must be sufficient to minimize air contaminants including ammonia and ozone from photocopiers and other duplicating machines. These machines shall not be placed in closets or in other enclosed areas without an HVAC supply and return.	ANSI/ASHRAE 62.1-2010

Smithsonian Institution

CAUTION

OUT OF ORDER
DO NOT USE

Date of shutdown: _____

Expected duration: _____

Responsible Person: _____

Department: _____ Phone: _____

Attachment 3

Practical Tips to Working Safely in a Fume Hood

#1: Remember that your fume hood is not a storage area. Keeping equipment and chemicals unnecessarily in the hood may cause block airflow.

#2: Do not allow blockage of air baffle openings at the back of the hood. Place large and bulky equipment, like ovens, on blocks to allow air to flow beneath and maintain an unobstructed path to the baffles. Do not leave paper towels inside the hood, or else they will be exhausted and block ductwork and fans.

#3: Substitute less hazardous materials for toxic chemicals whenever possible.

#4: Perform all work at least 6 inches from the front edge of the hood (far enough to avoid turbulence at front of hood, but close enough so that arms are not unnecessarily exposed). A stripe on the bench surface is a good reminder.

#5: Always position the sash between you and your work. Never place your head inside a fume hood!

#6: Open and close the sash slowly, move your hands slowly inside, and avoid rapid movements in front of the hood. Swift movements in front of or inside the hood may increase turbulence and reduce the effectiveness of fume hood containment.

#7: When the hood is being used, keep the hood sash closed as much as possible *unless the fume hood sticker states a particular height for the sash to maintain proper airflow*. (This will be the case for older conventional hoods without a bypass which do not adjust air volume at the face to compensate for changes in face opening area). Proper sash height will minimize energy usage and protect you from dangerous reactions.

#8: Keep lab doors and windows closed to ensure negative room pressure to the corridor and proper air flow into the hood. Look around to be sure that no other air stream is interfering with normal hood exhaust. Prevent cross drafts from open windows, open doors, fans, or air conditioners. Minimize foot traffic in front of hood.

#9: Electrical receptacles must always be mounted on the exterior of the hood. If outlets are inside the hood, they must be taken out of service and a new receptacle, if needed, then must be installed outside of the hood.

#10: The hood air flow must be fully operational before starting any spark-producing equipment (e.g., burners) inside a hood used for flammable liquids or gases.

#11: Do not use the hood as a waste disposal mechanism (e.g., for evaporation of chemicals).