TEXAS TECH UNIVERSITY

Operating Policy and Procedure

OP 60.04: Use of Laboratory Hoods, Biological Safety Cabinets, and Special Local Exhaust Ventilation

DATE: December 19, 2023

PURPOSE: The purpose of this Operating Policy/Procedure (OP) is to establish guidelines for the use of laboratory hoods, biological safety cabinets, and special local exhaust ventilation when using toxic or hazardous chemicals, pathogenic microorganisms, or radioisotopes in certain forms.

REVIEW: This OP will be reviewed in December of odd-numbered years by the Assistant Vice President for Environmental Health & Safety with substantive revisions forwarded through the Associate Vice President for Research (Research Integrity) to the Vice President for Research & Innovation and the Provost and Senior Vice President.

POLICY/PROCEDURE

1. Definitions

a. Standard Chemical Laboratory Hood – A regular laboratory-type ventilated enclosure that creates a negative air pressure within the hood and across the face of the hood to isolate and direct air contaminants away from the user and to prevent exposure to the user.

b. Perchloric Acid Laboratory Hood – A hood of the same basic design as the standard chemical laboratory hood but with a wash-down feature and constructed of a welded stainless steel. The face velocity for perchloric acid laboratory hoods shall be 80–100 fpm.

c. Conventional Laminar Flow Cabinet (Clean Air Cabinet) – The clean air cabinet, which was the result of industrial clean room technology, features a positive pressure that allows the air to flow **out** of the cabinet. Clean air cabinets are made in two basic configurations: horizontal (cross) flow and vertical (down) flow. Neither of these conventional types is considered a biological safety cabinet because personnel are potentially exposed to contaminated airflow from inside the cabinet, out and over the operator, and into the laboratory. Such units are suitable **only** for use with known "clean" materials where product protection is the only objective. Clean air cabinets are not for use with radioactive, corrosive, toxic, or infectious material.

d. Biological Safety Cabinet – A ventilated enclosure that provides a physical barrier between a worker and a hazardous operation. It may be used with an open front (or open glove ports) and with a high rate of ventilation away from the operator (like a laboratory hood) or with a closed front and attached rubber gloves. In the latter use, protection depends upon a negative pressure maintained within the cabinet. The ventilation air exhausts through a high-efficiency filter. Biological safety cabinets are to be certified yearly or when the cabinet is repositioned, whichever occurs first.

2. Functions of Exhaust Systems

Operations involving hazardous chemicals, pathogenic microorganisms, or radioisotopes in certain forms must be performed within the enclosures defined above. Local exhaust systems are a prime safety feature for laboratory workers and serve three major functions:

a. Confining hazardous materials and preventing airborne contaminants from coming into contact with persons working in the laboratory;

b. Exhausting these hazardous materials to a point where they may be discharged safely into the atmosphere; and

c. Providing sufficient air movement within the enclosure so that flammable vapor concentrations will be reduced below their lower explosive limits.

Ventilation used for work with highly pathogenic microorganisms will be fitted with HEPA filters to entrap these particles and prevent their discharge.

3. Precautions/Guides

a. Laboratory hood face velocities will be sufficient to maintain an inward flow of air across the entire face of the hood under all operating conditions.

b. Mechanical ventilation will remain in operation at all times when hoods are in use and for a sufficient time thereafter to clear hoods of airborne hazardous substances. When mechanical ventilation is not in operation, hazardous substances in the hood will be covered or capped and hood sashes will be closed.

c. When determining the need for ventilation, consider threshold limit values (TLV), toxicity, vapor pressure, flammability, possible formation of toxic dusts, aerosols, mists, vapors or gases, smoke, and pathogenic or carcinogenic properties. Use a laboratory hood when in doubt. Environmental Health & Safety (EHS) can assist in making these determinations.

d. Exhaust stacks of high hazards hoods will extend at least ten feet above adjacent rooflines and air intakes, parapets, and other prominent roof structures and will discharge vertically upward with an exhaust velocity of at least 2500 fpm. There should be no weather cap or other obstructions to prevent the exhaust discharge from rising straight upward.

e. Most sashes are not designed as “safety shields”; therefore, supplementary shields must be used for body protection when working with potentially violent chemical reactions or energetic materials.

f. All hoods should be maintained in a clean and orderly condition at all times. The use of laboratory hoods as a storage area will prohibit the hood from being used for any operations and should be avoided. Obstructions within the hood cause serious reduction in hood efficiency.

g. Local exhaust ventilation (special exhaust systems designed to ventilate a small area) is used to collect contaminants from specialized procedures.

4. Responsibilities of Administrators, Department Heads, Supervisors

a. Prevent any student or employee from working with a potentially hazardous substance that requires exhaust ventilation without the proper equipment in place and in good repair.

b. Route plans through Facilities Maintenance & Construction (FMC) and EHS prior to adding additional exhaust equipment to determine if the installation can be accomplished and to meet safety requirements.

c. Notify EHS if an exhaust system is not functioning properly.

d. Approve and fund certification of all biological safety cabinets a minimum of every year or when the cabinet is repositioned, whichever occurs first, or as often as the laboratory safety specialist deems necessary.

e. Obtain validation from EHS before the start-up of hoods after initial installation or repairs on existing hoods.

f. Ensure any student or employee who conducts operations with the aid of a laboratory hood, clean air cabinet, biological safety cabinet, or local exhaust system possesses the appropriate knowledge and training to do so in a safe manner.

5. Responsibilities of EHS

a. Survey each laboratory hood (and related components) a minimum of once a year. Hood ventilation performance will be identified as follows:

(1) Hoods certified for use with chemical hazards will have a blue and white label affixed stating the measured airflow during the last performance survey. The airflow will be stated as the average of the flow measurements recorded in feet per minute (fpm) of linear airflow and must be within the manufacturer's specifications.

(2) Hoods certified for use with radioisotopes will have a yellow and magenta label affixed stating the measured airflow during the last performance survey. The airflow will be stated as the average of the flow measurements recorded in feet per minute (fpm) of linear airflow and must be within the range of 100–120 fpm.

6. Responsibilities of FMC

Ensure that personnel are aware of the potential hazards involved when performing repairs and maintenance on hood units and cabinets and ensure that personnel are using proper personal protection when performing such repairs.