ASHRAE TC 9.10 – Laboratory Systems Lab Classification Subcommittee

Mission Statement

The ASHRAE TC 9.10 Laboratory Classification Subcommittee, in association with other organizations (including the AIHA Laboratory Health and Safety Committee and the ACS Division of Chemical Health and Safety), is developing a design standard that describes the facility engineering features appropriate to support safe management of chemical processes at the lab scale, as defined by OSHA. The primary objective of this standard is to assist in the identification of best practices for design of laboratory ventilation systems to support safe chemical use while providing cost effective, sustainable facilities.

It is recognized by the Subcommittee that the application of this guideline will require specific risk assessments for the chemistry being proposed for the space. In cases when this information is not available, reasonable descriptions of the type of work expected to be done in the space will be provided to the design team. Before chemical work is begun in these spaces, specific review of the work to be conducted will be required to determine whether it meets the assumptions associated with the project planning and construction process.

This Subcommittee's effort will be limited to issues related to heating, ventilating and air conditioning systems. It does not seek to duplicate work that is under the purview of other ASHRAE committees or other organizations, such as evaluation of fume hood containment (currently covered by the ASHRAE Standard 110) or overall environmental impacts of lab facilities (currently covered by the LEED program, ASHRAE Standard 90.1, and other standards and guidelines) are not part of the scope of this effort.

The first step in this process will be to evaluate the feasibility of developing such a standard, and whether a "Laboratory Safety Design Level" system similar to the Biosafety Level system can be developed. In addition to the determination of design criteria, such an effort will require a risk assessment protocol as well as a management of change component. These considerations are the reason for the cross-disciplinary nature of this effort.

While there are similarities between this effort and the NIH's Biosafety Level designations, we recognize that there are significant differences between chemical hazards and biohazards that present special challenges to this Subcommittee's work. Specifically, biological agents are of concern for their health hazards only. Conversely, the GHS system for classifying chemical hazards identifies 9 classes of chemical hazards, including both physical and health hazards; management strategies for some of these hazards appropriately include general ventilation requirements, whereas strategies for others do not. However, we believe that general guidelines for chemical laboratory design will prove valuable to the laboratory community by assisting in clarifying the

expectations of the many stakeholders involved in the design and operation of laboratories, and the use of hazardous chemicals therein, while also helping to reduce first costs and energy usage.

Key definitions:

Emergencies: situations in which chemicals are released in amounts or at rates that are beyond those planned for in the laboratory design process. These situations require extraordinary action in order return them to design conditions. It is expected that the primary emergency response strategy will be evacuation of laboratory workers and response by teams equipped with respiratory protection.

Laboratories: workplaces in which the chemical use meets OSHA's definition of *laboratory scale*; that is chemical are used in amounts that are readily manipulated by a single, trained person. Laboratory scale means work with substances in which the containers used… are designed to be easily and safely manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

Ventilation effectiveness: Ventilation effectiveness is the ability of the ventilation system to deliver specific air exchanges rates throughout the laboratory. The effective ventilation rate for a laboratory will be the lowest exchange rate found in the space, either through physical assessment or Computational Fluid Dynamics. The design goal for a laboratory will be the entire laboratory room be within 20% of the overall air exchange rate for the room, in order for the laboratory workers to work as expected in the room.

Volatile chemicals: Volatile chemicals are liquids and solids that evaporate at potentially hazardous rates, either through evaporation of the chemical or through products of expected reactions, into the workplace during planned use.