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National Risk Management
Research Laboratory
Cincinnati, OH 45268

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Project Summary

HVAC Systems as a Tool in Controlling Indoor Air Quality; A Literature Review

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The report gives results of a review of literature on the use of heating, ventilation, and air-conditioning (HVAC) systems to control indoor air quality (IAQ). The review covers the years 1988 through 1993, and involved 60 references, 32 of which are cited in the report.

This Project Summary was developed by the National Risk Management Research Laboratory's Air Pollution Prevention and Control Division, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Although significant progress has been made in reducing the energy consumption of HVAC systems, the role of HVAC systems in affecting indoor air pollution is not fully understood. It is apparent that the HVAC systems themselves very often contribute to the indoor air pollution problem because: (a) maintenance of the system is poor, (b) the design limitations of the building and the HVAC system have gradually, over time, been exceeded either through overcrowding or the introduction of new, pollution-generating sources within the building, and (c) the outdoor air intakes are located near ambient pollution sources.

IAQ problems frequently manifest themselves through Sick Building Syndrome or Building Related Illness (SBS or BRI). These can cause a loss in employee productivity. It is now recognized that there must be a trade-off between energy conservation and employee productivity. In addition, building owners and managers now recognize that failure to pay attention to IAQ problems may result in expensive litigation. The National Institute of Occupational Safety and Health (NIOSH) in a recent survey determined that in over 50% of the cases where IAQ problems existed, poor and inadequate ventilation was the problem. In cases where pollutants emanate from soil gases (e.g., radon), the installation and operation of an HVAC system can alter the IAQ.

Since the entry of soil gas is, to a large extent, dependent on the pressure differential between the soil and the structure, HVAC system operation can have a significant effect. Before an HVAC system is designed and installed, all operations in the building should be thoroughly examined with regard to potential pollution sources and a determination should be made whether local exhaust systems (such as hoods) need to be installed at the pollution source. Proper installation of local exhaust systems may significantly reduce the need for general ventilation.

Two primary types of HVAC systems are in use: (a) constant air volume systems and (b) variable air volume (VAV) systems. VAV systems compensate for variations in heating or cooling load by regulating the volume of air supplied to each zone. Energy conservation as well as improved controls and equipment have made VAV an increasingly popular option.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) has revised Standard 62-1981, replacing it with Standard 62-1989. The revised standard now includes an updated and revised IAQ procedure for which a model has been developed, and equa-

tions for calculating the amount of recirculation needed.

Numerous modeling schemes have been developed; however, little information has been published regarding the relative merits of the different models.

Contents of this report are based on a literature survey covering primarily 1988 through 1993 and a survey of 60 references, 32 of which are cited in this report.

Author M. Samfield, now deceased, was a consultant with the Agency. For report details, contact the project officer.
***David C. Sanchez** is the EPA Project Officer (see below).*
The complete report, entitled "HVAC Systems as a Tool in Controlling Indoor Air Quality; A Literature Review," (Order No. PB96-140561; Cost: $17.50, subject to change) will be available only from:
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650
The EPA Project Officer can be contacted at:
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