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BUILDING A SCIENTIFIC FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS

CLEAN **AIR** RESEARCH PROGRAM

# RESEARCH PROVIDES TOOLS AND INFORMATION TO IMPROVE INDOOR AIR QUALITY

## Issue:

Americans spend approximately 90 percent of their time indoors where levels of pollutants frequently can exceed those found outdoors. This is because indoor air can include outdoor pollutants that seep inside as well as indoor pollutants.

There is concern about the health effects that may result from exposure to indoor air pollutants. They have been linked to a variety of health effects, including respiratory health problems and worsening of asthma.

In 2001, the U.S. Environmental Protection Agency released the report, *Healthy Buildings, Healthy People: A Vision for the 21st Century*. The report contains a vision, goals, guiding principles, and potential actions to improve human health indoors.

While EPA does not have Congressional authority to regulate indoor air, the Agency offers guidance, information and research to improve indoor air quality.

Research is necessary to:

- Understand indoor sources and the penetration of outdoor pollutants indoors
- Determine exposures and health risks to common indoor pollutants
- Develop prevention and mitigation strategies.

In addition, the "green" building movement requires research that can inform decisions about the use of building materials and practices.

## Science Objective:

The Clean Air Research Program in EPA's Office of Research and Development studies indoor air pollution to examine air quality and source management. The health impacts of indoor contaminants such as biologic components and products are also studied, especially regarding risk populations such as asthmatics.

The goals of indoor air quality research are to:

- Provide critical information to risk assessors and regulators to support sound decisions on indoor environments.
- Provide recommendations for the design and operation of buildings to minimize the occupant exposure to toxic and harmful contaminants, e.g., formaldehyde.
- Develop diagnostic methods to identify and measure indoor contaminants that are emitted from soil, such as radon.
- Improve methods for reducing the intrusion of vapors into structures.
- Contribute to health science examining the role of

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microbials and biologics in allergic asthma.

The goals of source management research are to:

- Develop test methods for use by industries and others to promote pollution prevention and sustainability.
- Develop tools and guidance for the public to choose less polluting products and services.

Key scientific questions being addressed include:

- What are the major indoor sources of pollutants and their respective emission rates?
- How much outdoor pollution enters buildings?
- How much indoor pollution is produced by indoor chemical reactions among pollutants?
- What are the most cost-effective methods of reducing indoor exposure to contaminants?
- How can manufacturers design less-polluting products?
- What are some of the health impacts of indoor air pollution?

## Application and Impact:

Indoor air researchers have produced methods, models and other scientific tools and information to evaluate indoor air pollution sources, predict pollutant emissions and inform decisions to improve indoor air quality. For example, researchers developed models and simulations for predicting emissions from paint, which emit volatile organic compounds, based on product formulation and varied environmental factors.

Research has led to the development of tools that are used to select less hazardous cleaning products such as a tool that helps school managers compare exposure risks from alternative hard-surface cleaners

Research has improved knowledge about the chemistry of indoor air pollutants. For example, researchers discovered that the size of air pollutant particles makes a difference whether they penetrate into buildings. Extremely small particles are removed from incoming air because they adhere to surfaces as they go through leaks in walls to get indoors. On the other hand, slightly larger particles called fine particles can easily enter buildings along with fresh air because of their larger size and physical properties. However, the largest particles, such as dust, are generally filtered out and therefore have poor penetration into buildings.

Research on mold and other indoor microbiological contaminants has improved identification and prevention of mold and infestations as well as practical mitigation practices. For example, test methods have been developed for evaluating mold-resistant gypsum wallboard used extensively in buildings.

### REFERENCES

EPA's Indoor Air Quality web site: http://www.epa.gov/iaq/

Healthy Buildings, Healthy People: A Vision for the 21st Century. U.S. EPA OAR/ORIA/IED (6609J) 402-K-01-003, October 2001 http://www.epa.gov/iaq/hbhp/index.html

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