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# Indoor Air Facts

# No. 6

## Report to Congress on Indoor Air Quality

### Introduction and Background

In August 1989, the Environmental Protection Agency (EPA) submitted a report to Congress that describes the Agency's indoor air activities and recommends an appropriate Federal response to the problem of indoor air pollution. The *Report to Congress on Indoor Air Quality* was required by Title IV of the Superfund Amendments and Reauthorization Act (SARA) of 1986. The Office of Air and Radiation (OAR) and the Office of Research and Development (ORD) prepared the report with assistance from other EPA offices and other Federal agencies.

Title IV of SARA (the "Radon Gas and Indoor Air Research Act of 1986") directs the Environmental Protection Agency to establish an indoor air quality research program, to coordinate with other public and private organizations, and to disseminate information on indoor air quality issues to the public. It also requires EPA to submit two reports to Congress. In 1987, EPA submitted the report required by Section 403(d). The report contained the Agency's overall indoor air quality policy objectives and a near-term plan for implementing SARA Title IV. Section 403(e) requires EPA to submit a report two years after enactment of SARA that describes the activities carried out under SARA Title IV and that makes "appropriate" recommendations. This fact sheet summarizes the §403(e) report.

### Organization of the Report

The *Report to Congress on Indoor Air Quality* consists of an executive summary and three volumes. The *Executive Summary and Recommendations* briefly describes the entire report and presents the recommendations. Volume I, *Federal Programs Addressing Indoor Air Quality*, details the activities being carried out at eight Federal agencies, including EPA. Volume II, *Assessment and Control of Indoor Air Pollution*, summarizes the current level of knowledge and uncertainties about pollutants, sources, modeling and monitoring methods, concentrations, exposures, health effects,

existing standards, codes and legislation, economic impacts, and policy issues. Volume III, *Indoor Air Research Needs Statement*, is an interagency work-group assessment of the major gaps and research needs in the indoor air field. More detail is given below.

### Executive Summary

At this time, indoor air research and policy programs have not sufficiently characterized indoor air quality problems and solutions to be able to define the appropriate long-term Federal role regarding the need for, or desirability of, regulatory approaches to indoor air quality problems. Nevertheless, sufficient evidence exists to conclude that indoor air pollution represents a major portion of the public's exposure to air pollution and may pose serious acute and chronic health risks. Consequently, EPA makes the following recommendations:

1. Research to better characterize exposure and health effects of chemical contaminants and pollutant mixtures commonly found indoors should be greatly expanded.
2. A research program to characterize and develop mitigation techniques for biological pollutants in indoor air should be developed.
3. Research to identify and characterize key indoor air pollution sources and to evaluate appropriate mitigation strategies should be greatly expanded.
4. A program is needed to develop and promote, in conjunction with appropriate private sector organizations, guidelines covering ventilation, as well as other building design, operation, and maintenance practices, for ensuring that indoor air quality is protective of public health.
5. A national program of technical assistance and information dissemination, similar in scope to the Agency's radon program, is needed to inform the public about risks and mitigation strategies, and to assist State and local governments and the private sector in solving in-

door air quality problems. Such a program should include an indoor air quality clearinghouse.

6. The Federal government should undertake an effort to characterize the nature and pervasiveness of the health impacts associated with indoor air quality problems in commercial and public buildings, schools, health care facilities, and residences, and should develop and promote recommended guidelines for diagnosing and controlling such problems.

## **Volume I – Federal Programs Addressing Indoor Air Quality**

The Indoor Air Division within the Office of Air and Radiation is responsible for implementing the indoor air policy and program development provisions of SARA. Some of the chief indoor air activities which the OAR has completed include: cosponsoring an indoor air quality policy forum; conducting a survey of private sector diagnostic and mitigation services; publishing, in cooperation with the Consumer Product Safety Commission (CPSC), an indoor air quality booklet for the general public (*The Inside Story: A Guide to Indoor Air Quality*) and a directory of State indoor air contacts; and compiling a chart of Federal indoor air quality activities and contacts.

Projects underway in the Indoor Air Division include the development of a manual on work place policies related to environmental tobacco smoke, a manual on preventing indoor air quality problems in new or remodelled buildings, and an introductory indoor air quality course for State and local officials. In its coordination role, EPA takes the lead in co-chairing the Interagency Committee on Indoor Air Quality (CIAQ) with the CPSC, the Department of Energy, and the Department of Health and Human Services.

The Office of Research and Development is responsible for carrying out the research responsibilities mandated by SARA. Some of the major accomplishments of EPA's indoor air research program include: completion of an information assessment identifying the hazards of indoor environments; preliminary identification of adverse health effects from exposure to the emissions from kerosene and other unvented space heaters; measuring emissions from selected indoor sources in small chambers and a test house; and assessing the effectiveness of selected air cleaning technologies. Health effects research has focused on environmental tobacco smoke and mixtures of volatile organic compounds.

ORD has also completed several studies designed to assess the exposure of individuals to major indoor air

pollutants, including carbon monoxide and volatile organic compounds; additional research on pesticides and particulates is underway. Along with other Federal agencies, EPA is investigating complaints of indoor air pollution in the Library of Congress Madison building and the EPA Headquarters buildings.

Among the actions EPA has taken to address specific pollutant problems under SARA or several other statutes (e.g. the Toxic Substances Control Act (TSCA), the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and the Safe Drinking Water Act (SDWA) are the following:

**Radon.** Under the Radon Action Program, EPA has gathered information on the extent of the radon problem, developed cost effective methods for reducing radon levels in existing structures and for preventing radon entry in new construction, and issued many publications to help citizens and professionals. EPA is also developing standards for radon and other radionuclides in drinking water and cooperating with other Federal agencies in a number of radon-related activities.

**Asbestos.** The asbestos program at EPA has grown from a technical assistance program into a major national program that encompasses the full range of regulatory, grant, and technical assistance activities. While the primary focus of the asbestos program has been in the nation's schools, the program has begun to address asbestos problems in commercial and public buildings and in homes.

**Environmental Tobacco Smoke.** Reports published by the Surgeon General and the National Research Council of the National Academy of Sciences conclude that exposure to environmental tobacco smoke (ETS) is a cause of lung cancer in healthy non-smokers and is responsible for other health effects. Accordingly, EPA has undertaken activities related to ETS, including research, risk assessment, and public information.

**Formaldehyde.** EPA has designated formaldehyde for priority attention under TSCA. EPA is currently investigating the need for, and potential nature of, additional Federal regulations affecting formaldehyde emissions from pressed wood products (particleboard, hardwood plywood paneling, and medium density fiberboard.)

**Chlorinated Solvents.** An interagency workgroup, chaired by EPA, is examining the risks from four chlorinated solvents: methylene chloride, perchloroethylene, trichloroethylene, and 1,1,1-trichloroethane. The objective is to determine appropriate control options for use by EPA or other agencies.

**Pesticides.** Under FIFRA, EPA has taken a variety of measures to reduce exposure to harmful pesticides in the indoor air, including the removal of the cyclodienes (e.g., chlordane, heptachlor, aldrin, and dieldrin) from the market. Pesticide manufacturers are also being required to submit information about any human health effects from the so-called "inert" ingredients which are used as solvents or carriers for the toxic ingredients.

Other Federal agencies that have important programs to address indoor air quality issues include the CPSC, the Department of Energy, the Department of Health and Human Services, the General Services Administration, the Tennessee Valley Authority, the Occupational Safety and Health Administration, and the Department of Transportation. Indoor air activities of these agencies are also summarized in the report to Congress.

## **Volume II – Assessment and Control of Indoor Air Pollution**

Indoor air pollution is addressed from two perspectives. The first is an examination of indoor air pollution on a pollutant-by-pollutant basis, identifying key pollutants, sources, exposures, and risks. The second is an examination of the impact of the design, operation and maintenance of buildings on the health, comfort, and productivity of building occupants.

Part I of Volume II characterizes building systems in the United States and their impact on indoor air pollutant levels, and assesses the nature and magnitude of the potential health risks and costs resulting from indoor air pollution. Among the major conclusions drawn from this part of the report are the following:

- Biological contaminants, an important dimension of indoor air quality, can be the principal indoor air problem in some buildings. They can spread infectious diseases, can cause or aggravate allergic responses to airborne allergens, and can result in death, as with Legionnaire's disease.
- There may be additive or synergistic effects from multiple chemical contaminants at levels below thresholds known to cause health effects. Exposure to combinations of indoor air pollutants may generate acute reactions in some people.
- Sick building syndrome, building-related illnesses, and multiple chemical sensitivity are issues of potentially great significance but are poorly understood.
- Risk estimates are not available for most pollutants, but available estimates for radon, environmental tobacco

smoke, and volatile organic compounds demonstrate that indoor air pollution is among the nation's most important environmental health problems.

- Environmental tobacco smoke is particularly toxic, and may account for a significant number of cancer mortalities per year.
- The potential economic impact of indoor air pollution is quite high; preliminary estimates place potential impacts at tens of billions of dollars per year. Such impacts include direct medical costs and lost earnings due to major illness, as well as increased employee sick days and lost productivity while on the job.
- Labor costs may be 10 to 100 times greater per square foot of office space than energy and other environmental control costs. Where productivity is an important consideration, remedial actions to improve indoor air quality are likely to be cost effective even if they require expensive retrofit.

Part II of Volume II provides information on methods and strategies to control indoor air pollution and summarizes the key Federal legislative authorities and some of the policy options that might be considered as indoor air programs in the Federal government are developed. Among the perspectives that emerge from this part of the report are the following:

- Source control is the most direct and dependable control option, and may be the only effective control option when strong pollutant sources are present. However, where problems result from multiple sources, or where the sources of the problems are not known, source control may not be economically or technically feasible. In these cases, increased ventilation or air cleaning may be the only viable options.
- Low outdoor air ventilation rates designed to conserve energy can result in significant indoor air quality problems. Adequate outdoor air ventilation is a necessary component to an effective indoor air pollution control strategy, but adequate ventilation does not guarantee adequate indoor air quality.
- Air cleaning can complement but not replace the need for adequate outdoor air ventilation.
- Air cleaning and ventilation cannot be relied on as sole control strategies for environmental tobacco smoke.
- Control strategies involving source control, ventilation control, and air cleaning should be integrated into building design, operation and maintenance procedures.

- Individuals can exercise a high degree of control over their own indoor environment, particularly in residential settings, and may reduce their exposure to indoor air pollutants at little or no cost. Making informed choices concerning the types of products and materials purchased and their use, properly caring for and maintaining potential sources such as combustion devices, and appropriately balancing indoor air quality and energy concerns in ventilation practices are examples of decisions and actions that can significantly improve indoor air quality.

- Standardized protocols for investigating and solving indoor air quality problems need to be developed.

- The Clean Air Act cannot be used to regulate the quality of the air indoors.

- Many Federal agencies have the explicit legal authority to regulate products and/or activities that affect indoor air quality. Existing authorities are limited for the most part to specific products or environments.

- SARA Title IV provides EPA with direct authority to conduct an indoor air research, coordination, and information dissemination program, but does not enhance EPA's regulatory authority with respect to indoor air quality beyond existing authorities under TSCA, FIFRA, and SDWA.

- Significant potential exists for cooperative, coordinated indoor air quality control programs at the Federal and State levels and in the private sector. Current programs at all levels of government and the private sector are generally fragmented and underfunded.

- Due to the variety of indoor air pollutant sources and control measures and the many types of indoor environments, many policy options are available including developing public information and technical assistance programs, establishing pollutant-specific or product-specific standards or guidelines, and providing guidance on identifying and correcting indoor air quality problems in existing buildings or preventing problems in new construction. Each of these may be implemented in either a regulatory or nonregulatory manner.

### **Volume III – IAQ Research Needs**

Prepared by an interagency workgroup of the CIAQ under the sponsorship of EPA's Office of Research and Development, the statement of major indoor air research needs is divided into seven categories: risk assessment

methods; exposure assessment and modeling needs; source-specific needs; control techniques; building system research; crosscutting research; and technology transfer. The report contains a table summarizing the major indoor air research needs including relative priorities. To undertake the projects set forth in this assessment would require a combined effort of the Federal and State governments and the private sector.

### **Indoor Air Quality Publications for the Public, Developed Under SARA Title IV**

*The Inside Story: A Guide to Indoor Air Quality.* EPA and CPSC, 1988.

*Directory of State Contacts on Indoor Air Quality.* EPA and the Public Health Foundation, 1988.

Indoor Air Fact Sheet Series:

Indoor Air Facts #1: EPA and Indoor Air Quality. EPA, 1987

#2: Indoor Air Quality Implementation Plan. EPA, 1987

#3: Ventilation and Air Quality in Offices. EPA, 1988

#4: Sick Buildings. EPA, 1988

#5: Environmental Tobacco Smoke. EPA, 1989

#6: Report to Congress on Indoor Air Quality. EPA, 1989

#7: Residential Air Cleaners. EPA, 1990

*Project Summaries: Indoor Air Quality in Public Buildings.* Volumes I and II. EPA, 1988.

*The Total Exposure Assessment Methodology (TEAM) Study.* Project Summary. EPA, 1987.

*Residential Air-Cleaning Devices: A Summary of Available Information.* EPA, 1990.

These publications and the full report can be ordered from the EPA Public Information Center, 401 M Street, SW, Mail Code PM-211B, Washington, DC 20460.