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State and Local Indoor Air Quality Programs: Five Case Studies

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STATE AND LOCAL INDOOR AIR QUALITY PROGRAMS: FIVE CASE STUDIES

Environmental Law Institute

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State and Local Indoor Air Quality Programs
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Report Findings

In the absence of a general regulatory indoor air quality (IAQ) program at the federal level, some states and local governments have seized the opportunity to protect the indoor environment and reduce health risks associated with indoor air contamination. The diversity of IAQ programs among these states makes it difficult to generalize about them. The four states and one local government surveyed for this report -- California, Florida, Minnesota, Vermont and Montgomery County (Maryland) -- have implemented a broad range of programs to address IAQ issues. These programs are illustrative of various strategies, tools and approaches that states can employ in protecting indoor air quality, a complex and multi-faceted field of environmental health.

The federal government has played an important role in the development of state and local IAQ initiatives. In particular, the Environmental Protection Agency's non-regulatory IAQ program has provided research, education and funding to state and local programs and has been a catalyst for indoor air activities in a number of areas. State and local officials generally support continuation of federal efforts to facilitate IAQ programs and to promote IAQ standards and guidelines that can be adapted at the state and local level.

The findings in this chapter, set out below, highlight key features of the IAQ programs studied for this report. They describe the types of agencies that implement IAQ programs; mechanisms for coordinating IAQ activities among agencies; the nature of program activities; the relationship between state and local governments; and key factors affecting the development of IAQ programs, such as legislation, program resources and stakeholder participation.

- Jurisdiction over indoor air quality issues is divided among different state and local agencies, reflecting the multi-faceted nature of IAQ problems.

- Some states have established interagency IAQ working groups. In Florida and Vermont, working groups were created in order to develop policy and program recommendations in the area of indoor air quality. In California, the group began and continues to serve as a mechanism for sharing information and facilitating collaboration among state agencies.

- All four states surveyed have central IAQ programs within the state's health agency, while Montgomery County's central IAQ program is housed in the county's environmental agency. These programs vary considerably in focus and scope, though all address a broad range of IAQ issues and serve an informational or educational function. In California, extensive research activities are a foundation for the program's activities. Florida's program emphasizes technical assistance to building owners / managers and the public. Montgomery County,

Maryland also provides considerable technical assistance in facilitating resolution of IAQ problems.

- In addition to a central IAQ program, various state agencies typically address specific aspects of indoor air quality. These agencies include education (IAQ in schools); labor (IAQ in workplaces); general services / management (government buildings); building codes (ventilation and other construction standards); and agriculture (pesticide applications). Often, the agencies work with and receive support from the central IAQ program.

- The state's central IAQ program is generally non-regulatory in nature, focusing on a combination of research, education and technical assistance activities. In some cases, the program also enforces specific legislative or regulatory requirements -- for example, restrictions on smoking (Florida, Minnesota, Vermont), mandatory certification of radon professionals (Florida), or IAQ standards for enclosed sports arenas (Minnesota).

- Two types of state agencies are likely to carry out IAQ-related regulatory activities. The state labor agency is usually charged with implementing occupational health and safety standards, including those relating to indoor air quality. The state building codes agency is responsible for adopting new construction requirements, although these requirements are typically enforced locally through the building permit process.

- IAQ managerial functions are undertaken by the state agency responsible for construction, operation and maintenance of state-owned or leased buildings. Florida, California and Vermont actively address IAQ in public buildings through their general services / management agencies.

- While indoor air quality in schools has been a common concern, local school districts generally have considerable autonomy in decision making, and the role of the state is limited accordingly. Vermont has taken a broad approach by establishing an interagency committee to develop policy and program recommendations. Minnesota provides funds to school districts for IAQ capital improvement projects. Both Minnesota and Florida provide technical assistance and information to local school officials. The Montgomery County Public School system is responsible for school construction and maintenance and has an active IAQ program.

- The role of local governments in indoor air quality issues depends in part on local financial and political commitment to IAQ problems, and in part on the relationship between state and local governments. In Florida, where the state implements a local matching grants program, the majority of the state's population is covered by a local health department IAQ program. A small number of these local programs predated state assistance. In Montgomery

County, Maryland, the county government has an active IAQ program despite the absence of a formal state IAQ program.

- The development of IAQ programs reflects the general interest in IAQ issues on the part of officials, legislators and the public, as well as concern arising from specific, highly publicized IAQ problems. IAQ problems in individual government buildings and schools in Florida and Vermont have spurred the development of IAQ activities in those states, while climatic conditions in Minnesota and Florida have focused attention on specific IAQ issues.

- Although states generally have not enacted comprehensive IAQ laws, legislation has played a significant role in the development of IAQ programs. State laws have mandated the creation of IAQ programs and authorized or required a variety of IAQ program activities. State laws have also regulated behavior related to indoor air quality, particularly with respect to smoking and radon.

- There are relatively few state regulations establishing mandatory IAQ standards or protocols, though agencies have promulgated regulatory requirements specific to certain environments or circumstances. One common area of regulation is building codes, where new construction standards generally include minimum ventilation requirements. California is notable among the states surveyed for regulations governing operation and maintenance of workplace ventilation systems. Minnesota has adopted IAQ standards for enclosed sports arenas and workplaces.

- Funding plays a critical role in the development of IAQ programs. Funding for the work of a state's central IAQ program is derived mainly from general state revenues and federal grants. Other state agencies usually do not receive funding targeted for IAQ activities, but rather carry out IAQ work as part of their efforts to address health and safety issues generally.

- State and local governments have contact with a variety of IAQ stakeholders, including health and environmental groups, unions, individual members of the public, building owners and managers, building professionals (e.g., architects, engineers, IAQ consultants) and product manufacturers. Agencies work with these stakeholders to carry out IAQ activities, to address site-specific IAQ problems, and to seek to change institutional and personal behavior that affects indoor air quality.

Chapter One

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Introduction

Indoor air quality is a key public health issue that has many dimensions and is addressed by government and the public on many different levels. The federal government addresses IAQ issues through a variety of agency programs. Some agencies exercise traditional regulatory authority over specific aspects of indoor air quality ranging from workplace indoor environmental protection to pesticide regulation. Unlike other environmental areas, however, no general federal statutory authority exists to regulate indoor air quality. The federal government's general, non-regulatory, indoor air quality program is housed in the Indoor Environments Division of the Environmental Protection Agency (EPA). EPA is charged primarily with undertaking research and disseminating information on indoor air quality issues. Other EPA offices exercise control over individual IAQ contaminants, such as asbestos and lead. An important element of EPA's role in this field is to provide support to, and assist in coordinating, state and local governments in their IAQ program activities.

In the absence of a federally mandated scheme for addressing general IAQ issues, states are largely free to set their own priorities and experiment with different types of programs. The indoor air quality programs of state and local governments are thus in various stages of development and vary widely in scope and emphasis. This report uses a case study methodology to examine the approaches taken by four states and one local government to improving and protecting indoor air quality.

Purpose of the Report

This report provides government officials and the public with a better understanding of how four states and one local government address indoor air quality issues through their programs, laws and policies. By examining the origins, scope and evolution of IAQ programs that have been particularly active, the study seeks to illuminate a broad range of approaches to improving indoor air quality.

The principal purpose of this report is to facilitate the further development of state and local IAQ programs and policies. The report also seeks to assist non-

governmental parties and individuals who are interested in promoting programs to protect and improve indoor air quality.

This report does not attempt to evaluate nor to formally compare programs. Rather, it provides insight into the approach of each jurisdiction surveyed, and illuminates the differences and similarities among the programs. The report seeks to enable state and local governments to benefit from the rich and varied experiences of these programs. It is also intended to serve as a template for future research in this area, because little analytical information about state and local IAQ programs is currently available.

Research Scope and Methodology

This report defines indoor air quality issues broadly. Two indoor pollutants -- lead and asbestos -- have been excluded because they are addressed by governmental programs that have been extensively analyzed elsewhere. In-depth evaluation of how states and local governments address these two indoor air problems would duplicate the efforts of others.

The report examines the IAQ programs of four states (California, Florida, Minnesota and Vermont) and one county (Montgomery County, Maryland). These jurisdictions were selected because of their considerable IAQ program activity and the variations among them with respect to program emphasis and organization. Although the report focuses on state IAQ programs, the role of local government is discussed in relation to the four states surveyed. In addition, the portion of the report examining Montgomery County highlights the role of local government in a state that lacks a general indoor air quality program.

The principal sources of information used to compile this report are interviews conducted with state and local IAQ program officials. Unless otherwise indicated, the information contained in this report is derived from interviews with program officials. The study would not have been possible without the generous contribution of time by these individuals.

For the five jurisdictions surveyed, the Environmental Law Institute contacted the central IAQ program, the agency responsible for developing building codes, and the agencies that carry out IAQ-related activities in schools, workplaces and government

owned buildings. ELI also contacted agencies that are responsible for significant IAQ-related issues, even if those activities are sporadic or peripheral to the agency's central program focus. In some cases, more than one interview was held with the same program office. State officials and local government personnel reviewed, and extensively commented upon, relevant drafts of the report. ELI also contacted non-governmental organizations to obtain information about selected issues in each jurisdiction. ELI did not utilize a written survey instrument; virtually all of the interviews were conducted by telephone.

Other important sources of information for this study are state and local IAQ laws, regulations and policies, as well as other written materials prepared by government agencies. Some of these materials were provided by the officials surveyed, while others were collected independently by ELI. Most information contained in the report was obtained during the period May 1 - September 5, 1997.

Organization of the Report

Following this chapter, the report presents an overview of state and local IAQ programs based on the information collected during the study. The overview describes the scope and organization of IAQ programs in the five jurisdictions surveyed and discusses key factors that have contributed to program development.

Following the overview are five chapters that present detailed information about each of the jurisdictions surveyed. These chapters follow a common format. Each is organized by agency / program, beginning with the central IAQ program office, and includes information about the program's origin and resources; the legislation, regulations and standards implemented by the program; and the IAQ activities carried out by the program. Each chapter concludes with a summary describing the programs and discussing selected factors influencing program development.

The report contains three appendices that provide information about agencies with IAQ functions, IAQ legislation and IAQ regulations.

Chapter Two

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State and Local Indoor Air Quality Programs

Indoor air quality is a growing concern in the United States, where people spend about 90 percent of their time indoors. Public opinion surveys and comparative risk studies undertaken during the past several years have ranked indoor air quality as one of the most serious environmental threats to public health.

The nature of indoor air quality issues presents challenges to state and local governments as they seek to develop programs and policies. Sources of indoor air contamination are numerous and diverse. Some problems are transient (for example, exposures from one-time use of a chemical), while others reflect ongoing practices (for example, use of an inadequate ventilation system). A policy that is appropriate for addressing one pollutant, such as environmental tobacco smoke, may be inappropriate for dealing others, such as radon and carbon monoxide. A great spectrum of individual and group behaviors contribute to IAQ problems in many different types of indoor environments -- single-family homes and large apartment buildings, private office buildings and retail shops, state-owned buildings and local school facilities.

In the 1980's and 1990's -- and particularly over the past few years -- some state and local governments have been addressing these challenges through new indoor air quality offices and through existing agencies. The states covered in this report -- California, Florida, Minnesota and Vermont -- have taken a variety of approaches to institutionalizing IAQ programs. This chapter first reviews the federal context for these programs. The chapter then highlights the key features of the programs surveyed and discusses several factors that have figured prominently in their development.

I. THE FEDERAL ROLE IN IAQ ISSUES

Traditionally, state environmental and public health programs have been developed after the enactment of federal legislation that included (1) national standards, enforcement mechanisms and related provisions and (2) authority for the federal administrative agency to delegate the program to the state. Once delegated, the state operates the program using a regulatory authority and strategy that was dictated largely by the federal legislation, and was very similar from state to state. Programs for

drinking water, hazardous waste and pesticides follow this traditional pattern. This type of environmental and public health federalism usually comes to mind when policy makers think about controlling environmental and public health threats.

Indoor air quality programs have developed, and now operate, very differently. Although a number of states have IAQ programs, with the exception of the occupational environment, there is no omnibus federal regulatory authority over indoor air. The federal government has been granted only limited, research authority to address IAQ issues. As a result, states have assumed leadership in creating, staffing and operating IAQ programs without the benefits and constraints of a strong central authority.

Nevertheless, federal support of and coordination with state agencies has been an important factor in the development of state IAQ programs. A number of federal agencies interact with state IAQ programs, including the Environmental Protection Agency, the Department of Labor, the Department of Energy, the Consumer Product Safety Commission, the Department of Agriculture, the Department of Housing & Urban Development and the Department of Health and Human Services. While the Department of Labor has authority over workplace health matters, EPA is the federal agency charged with addressing indoor air quality issues generally.

EPA's non-regulatory IAQ program has provided research, education and financial support to facilitate state and local IAQ activities and has been a catalyst for state indoor air activities in a number of areas, notably radon in residences and general indoor air quality in schools. EPA works with state governments through its ten regional offices. The EPA regions often maintain close, ongoing communication with state IAQ program officials. In some cases, the regional office participates in regular meetings with state program officials -- for example, California's IAQ Working Group meetings, or the quarterly conference calls for IAQ officials throughout EPA Region IV.

EPA funding has been particularly important in establishing state radon programs. EPA's State Indoor Radon Grants (SIRG) program has resulted in large, active radon programs in many states, including those surveyed. EPA has also funded numerous IAQ-related research projects, some of them in conjunction with state agencies. EPA educational materials have served as the basis for a wide range of state and local outreach and training programs. Principal among these materials are the IAQ Tools for Schools kits and the publication *Building Air Quality: A Guide for Building*

Owners and Facility Managers. EPA has been especially active in sponsoring and participating in workshops for school officials based on the IAQ Tools for Schools materials.

The following priority areas for future federal IAQ activities emerge from the interviews conducted with IAQ officials in the jurisdictions surveyed.

Resources. EPA's funding of radon and other IAQ work, the Department of Energy's funding of energy efficiency research, and funding from other agencies (such as Housing and Urban Development, for lead programs) is seen as important to the ongoing work of state governments. Direct federal funding of local IAQ programs is also seen by some as a potential mechanism for increasing IAQ activity at the local level.

Research. Many state officials view research as a key function of the federal government, in order to avoid duplication of individual state efforts. Officials point out, however, that regional IAQ issues should be addressed in the development of research projects at the national level.

National Guidelines and Priorities. State officials generally recognize that the federal government should establish guidelines or a framework for addressing important IAQ issues in the U.S. Within that framework, state agencies would be free to determine their own priorities. Some officials advance the argument that the federal government should adopt mandatory IAQ standards in certain areas (such as non-industrial occupational exposures and indoor application of pesticides). Others argue that the federal government should promote the creation and updating of national model standards that states can adapt to local conditions.

Training. Federally developed and sponsored IAQ training courses and training materials are widely viewed as valuable components of federal IAQ programs.

Communication and Support. State and local officials express interest in more direct communication with federal agencies such as EPA, both to provide input into federal activities and to obtain technical assistance and support.

II. THE STRUCTURE AND SCOPE OF STATE IAQ PROGRAMS

While the jurisdictions surveyed are not necessarily representative of IAQ programs throughout the country, they provide insight into the similarities and differences in governmental approaches to protecting and improving indoor air quality. Some of the key questions to address in studying the IAQ programs of a state or local government are:

- How are IAQ responsibilities distributed among various agencies and offices?
- How do different agencies and offices coordinate their IAQ-related activities?
- What activities do IAQ programs undertake in order to address priority issues?
- How do state IAQ programs interact with and support local government efforts?

A. Distribution of Jurisdiction Among State Agencies

Indoor air quality activities are divided among a variety of state agencies and offices, reflecting the multi-faceted nature of IAQ problems. This distribution of IAQ jurisdiction has advantages and disadvantages. The opportunity to draw on the expertise and experience of other offices can enhance the ability of any single program to address IAQ issues. On the other hand, the need to coordinate actions with other offices and accommodate different institutional goals can require additional time and resources. Some of the jurisdictions surveyed in this report have formed interagency committees that facilitate communication among agencies and help reduce the likelihood of conflict and duplication of effort.

Program authority over IAQ issues is usually distributed between a central IAQ office and a number of other offices that address IAQ issues as part of a broader mission. Appendix A provides a description of agencies with IAQ functions for each jurisdiction surveyed.

1. Central IAQ Offices

All of the states studied have created a central indoor air quality program within their principal health agency to address general IAQ issues. These programs are: the Indoor Air Quality Section of the California Department of Health Services; the Radon and Indoor Air Office of the Florida Department of Health; the Indoor Air and Lead

Unit of the Minnesota Department of Health; and the Office of Environmental Health of the Vermont Department of Health. These central IAQ programs serve as the principal state IAQ resource, and provide support and assistance to other state agencies on many IAQ issues.

The size and scope of activities of the central IAQ programs vary considerably among the jurisdictions surveyed. In general, the programs tend to address all IAQ issues except those that fall specifically to another agency (for example, lead poisoning or asbestos abatement). The central IAQ programs range in size from a one-person office in Vermont to a 22-person office in Minnesota. Vermont's single IAQ staff person has responsibility for virtually all indoor air-related issues, including occupational exposures. Minnesota's large IAQ office reflects broad jurisdiction over IAQ problems, including lead. The Florida and California offices are comprised of 14 and 8 staff members, respectively.

California's agency structure is somewhat unique, because the state has a second office that plays a key role in addressing general IAQ issues. The California Air Resources Board, the state's central air quality office, carries out extensive research and education on a wide range of indoor pollutants. The Indoor Program within the Air Resources Board has 4.5 staff positions.

2. Other State Offices

In addition to central IAQ program offices, other state and local programs address various aspects of indoor air quality as part of their responsibility over specific pollutants, specific building environments or specific regulatory activities.

Pollutant Focus. In some cases, individual air pollutants are addressed by separate offices within the health department or other agency. This is most often the case with respect to environmental tobacco smoke, radon, lead and asbestos. State activities in these areas may be conducted separately from other "general" IAQ programs due, in part, to the fact these pollutants are often the subject of regulation and of targeted funding.

In California, the labor agency enforces the state's law restricting smoking in workplaces. Radon, which has been the focus of considerable national attention and is the subject of numerous state laws, is housed in a separate program within the state

health departments in California and Vermont. With respect to asbestos and lead, two pollutants not addressed directly in this report, only Minnesota's central IAQ office covers lead, and only California's IAQ office addresses asbestos issues.

Building Focus. Responsibility for indoor air quality is diffuse in large measure because many state agencies are responsible for health and safety issues linked to building use. All of the states surveyed have separate agencies with IAQ-related responsibilities for the following indoor environments:

- Workplaces -- the state's labor agency generally contains an office responsible for enforcing health and safety requirements in public and/or private workplaces. These requirements incorporate federal (OSHA) standards.

- Schools -- the state's education agency generally provides technical support and assistance (and in some cases financial aid) to local school districts, which are responsible for addressing IAQ issues in new and existing buildings.

- State-owned and leased buildings -- the state often has a separate agency responsible for overseeing the construction, operation and maintenance of some or all state-owned or leased buildings.

Since schools and state buildings are also workplaces, the labor agency may work with the education and state buildings agencies in addressing IAQ issues.

In three of the states studied, the relationship between the state's labor agency and the health agency has been formalized through agreements or funding arrangements. In Vermont, the central IAQ program investigates workplace IAQ problems that do not involve violation of OSHA standards. In California, the Department of Health has two program offices that work exclusively on occupational health issues, and consult with the state Department of Industrial Relations on IAQ matters. By contrast, Florida's health and labor agencies have signed a memorandum of agreement formally dividing jurisdiction over IAQ issues, based on whether the building is residential or non-residential.

Activity Focus. An important IAQ-related activity that falls outside of the central IAQ program is the regulation of building construction. Requirements for mechanical systems and other design features in new buildings can substantially impact indoor air

quality. Each state studied has an agency that is responsible for adopting the state building code. State building code provisions either are mandatory throughout the state or serve as a basis for local code development, and they generally are enforced by local governments through the building permit process. With respect to state-owned buildings, often the state's building agency is responsible for adopting design and construction requirements. With respect to school construction, the state may have authority to adopt standards or guidelines that must be met by local school districts.

Pesticide regulation is another activity that is carried out by a separate state agency, generally the agriculture department. This agency's responsibilities usually extend to regulating pesticide applicators, including those who apply pesticides in or around buildings. In cases involving indoor air quality problems from the application of pesticides, the state's central IAQ office is often called on to address health-related issues.

B. Interagency Coordination

Because there are many agencies and offices that have some responsibility over indoor air quality issues, communication and cooperation among programs are imperative. Different offices often work together on a regular basis to address specific IAQ problems in schools, state buildings and other indoor environments. The central IAQ office is frequently consulted by other agencies. In three of the states surveyed, interagency committees -- formed in response to state legislation -- have played an important role in enhancing communication about diverse indoor air quality activities.

In Vermont, the Indoor Air Quality Committee on Schools and State Buildings is the mechanism for coordinating a far-reaching effort to evaluate IAQ issues and formulate policies to address those issues. The Committee expects to develop IAQ standards and protocols, including protocols for coordinating state response to IAQ complaints and inquiries.

In Florida, a similar interagency committee was convened to report to the legislature regarding non-residential indoor air quality issues in the state and to propose policies for addressing IAQ problems. The Florida Indoor Air Quality Committee produced a report recommending that the state take action to develop standards, conduct research and provide education and training. Although the Committee has no formal mandate or funding, several members continue to meet

informally to exchange information. Florida agency officials also participate in quarterly conference calls hosted by EPA Region IV, which provide an opportunity to discuss IAQ issues and activities with officials throughout the region.

California's Interagency Working Group on Indoor Air Quality has been in existence since 1982. The Working Group functions primarily as a vehicle for sharing information. Membership is open to all state agencies and includes a multitude of state, local, federal and non-governmental parties.

At the local level, the Montgomery County Public Schools system has formed an interagency Process Action Team, including the county's central IAQ program and the Chief Medical Officer. The group is looking broadly at how to identify and address IAQ issues in the construction, operation and maintenance of schools.

C. IAQ Activities

State and local governments undertake three general types of activities to address indoor air quality issues: (1) investigative, informational and educational activities; (2) activities to ensure compliance with IAQ standards and other regulatory requirements; and (3) construction, operation and maintenance activities for government buildings. How and where these activities are carried out reflect both the particular focus of the central IAQ program and the extent to which other state programs have incorporated IAQ issues into their core program responsibilities.

The activities described in the following paragraphs are *mechanisms* for addressing IAQ problems. The *types* of IAQ problems that states and local governments seek to address vary from state to state and reflect the broad scope of potential indoor air issues. One state's heavier focus on a particular pollutant (e.g., radon or environmental tobacco smoke) or type of indoor environment (e.g., residences or schools) is the result of a host of factors ranging from legislative directives and levels of funding to stakeholder involvement. The factors influencing both the establishment of priority IAQ issues and the implementation of activities to address those priorities are discussed in Part III of this chapter.

1. Investigative, Informational and Educational Activities

Research. California's principal IAQ programs have played a leading role in IAQ research for many years. California agencies have funded and carried out numerous

research projects alone and in conjunction with federal and non-governmental offices. Examples include research on residential exposure concentrations of volatile organic compounds (VOCs), inhalable particles, formaldehyde and toxic metals; the effectiveness of building "bake-outs;" the use of engineering controls for designated smoking areas; and allergen concentrations in household dust. Other states carry out more limited research activities, sometimes in response to particular IAQ problems or concerns brought to the attention of an agency.

Technical Assistance/Complaint Response. The provision of technical assistance in response to site-specific IAQ problems is a core program activity in Florida. The state's central IAQ program provides and funds technical assistance on building-specific IAQ problems. It offers telephone consultation as well as on-site visits. Technical assistance has focused on residential buildings, although it also includes assistance in cases involving government and commercial properties. Montgomery County's central IAQ program is also focused on responding to public inquiries, and the program facilitates technical solutions to a wide range of IAQ problems in private businesses and residences. Vermont's central IAQ office responds to public inquiries on a more limited basis, but does respond to workplace IAQ complaints by agreement with the state labor agency. California and Minnesota generally do not provide site-specific technical assistance to private businesses and residential property owners.

None of the surveyed programs have authority to order repairs to fix IAQ problems, except (in rare circumstances) for violations of workplace standards or other regulatory requirements. Program staff enter premises by invitation only, and offer technical suggestions aimed at solving IAQ problems. States generally advise people to contact private IAQ professionals to obtain additional advice and arrange for remediation services. In areas where a state does not provide technical consultation, agencies may refer people generally to private consultants. Three of the states surveyed have developed listings of IAQ consultants, which are distributed upon request. Most of the state labor agencies surveyed also offer consultation services to assist private businesses in complying with workplace health and safety regulations, which may involve analysis of IAQ problems.

Training. Training of building personnel is viewed by many state programs as an essential component of their IAQ work. These training activities generally target state and local officials that are responsible for the operation and maintenance of government buildings. State building agencies in Vermont, Florida and California have developed

and implemented training programs for building managers and staff. State agencies in Florida and Minnesota, as well as Maryland, have focused on providing training to local school officials. In many instances, these training programs have been based on EPA's IAQ Tools for Schools materials. Some agencies, including Florida's labor department, provide IAQ training to private sector employers / building managers.

Development of Educational Materials and Guidance Documents. One of California's principal IAQ activities is the development of non-binding guidelines and other educational materials designed to improve the way in which governmental and non-governmental parties address IAQ issues. For example, the Air Resources Board is preparing a series of health-based guidelines for indoor air quality in non-occupational indoor environments; guidelines for formaldehyde and combustion pollutants have already been produced. Other technical documents cover procedures for conducting ventilation system inspections, and procedures to reduce exposure to VOCs in newly constructed buildings and during the remodeling of buildings.

Minnesota also has been active in developing technical brochures for the public. The state's Department of Health has produced numerous brochures covering subjects ranging from air cleaners to humidifiers and from mold to ozone, as well as a series of brochures about radon. At the local level, Montgomery County has produced written materials on two topics of particular concern in the county -- radon and carbon monoxide.

General Public Education. In addition to producing written materials and providing technical assistance and training, nearly all of the state and local IAQ programs surveyed educate the public about IAQ issues. Public education programs chiefly involve responding to telephone inquiries and making presentations before interested groups.

2. Enforcement and Compliance Assurance

In the jurisdictions surveyed, the state's regulatory authority over IAQ issues rests principally with the offices responsible for labor matters and building codes. All states surveyed have labor agencies that conduct enforcement of health and safety requirements in public and / or private workplaces. These enforcement activities generally do not involve IAQ problems in office buildings or other commercial establishments, since the standards incorporate exposure limits that relate to industrial

workplaces. All of the jurisdictions surveyed also have agencies that are authorized to adopt building code requirements, including ventilation and other IAQ-related provisions.

Environmental tobacco smoke is another area of enforcement common to the surveyed states, although local governments play a prominent role in enforcing state smoking laws. In addition, Florida's central IAQ program enforces the state law requiring certification of radon professionals, while Minnesota's program enforces regulatory standards for contaminants in enclosed arenas.

3. Building Management and Construction

State governments generally have managerial responsibilities for IAQ problems in buildings that are owned or leased by the state. States also address IAQ issues in the construction of new state buildings. Some of the jurisdictions surveyed (California, Florida, Vermont) have personnel within the state general services / management agency who spend a considerable amount of time on IAQ issues. Their activities include responding to employees' IAQ complaints, taking remedial actions, and carrying out preventive maintenance. In other states, maintenance and operations in public buildings is left mainly to the individual state agency that owns the building.

Local governments also may exercise management functions with respect to the properties they own or lease, while school districts are charged with handling IAQ and other health and safety issues in their facilities.

D. State-Local Relationships

A substantial component of many state programs is assisting county and municipal governments in addressing IAQ problems at the local level. Local officials are often in the best position to work with affected parties, because of both their physical proximity and their involvement in other health and safety issues in the community. Of the four states surveyed, all except Vermont have county and municipal government structures with a number of large and active local governments. Vermont's municipalities are small, and most indoor air quality work takes place at the state level. In Maryland, Montgomery County is among the largest and most active county governments in the state.

1. General IAQ Programs and Activities

States support local IAQ programs in different ways and to different degrees. It is often the larger county and municipal governments that have sufficient resources to implement general IAQ programs through their health or environment agencies. Florida takes the most active and direct approach to developing local IAQ programs. Florida's general indoor air funding is used for matching grants, which help fund trained IAQ staff at the local health department. The unique structure of the state Department of Health facilitates this arrangement; local health departments are funded by the state in large measure and are staffed by state employees. The grants program reflects Florida's emphasis on IAQ technical assistance, and is based on the view that local governments are generally in the best position to assist local residents in understanding and resolving site-specific indoor air quality problems. The grants program leverages local funding and enables the Department of Health to reach a greater number of people. The Department provides back-up support, including training and technical assistance, to the local programs.

Minnesota also provides IAQ-related funding to local governments, though these funds are targeted mainly to specific program areas -- generally radon and lead. Minnesota has established and provides support to the "Indoor Air Coordinators," a coalition of mainly local government officials. Through the coalition, the state IAQ program provides training and information to local officials and assists local agencies in developing their IAQ programs.

While the state of California generally does not fund local programs, state agencies provide local government officials with IAQ information and assistance relating to indoor air activities. In particular, local health departments, which often lack funding to implement an IAQ program, consult with or refer callers to the state Department of Health Services. Offices within the Department of Health Services also provide technical advice and training to local government agencies on workplace health issues, as well as on performing site investigations, collecting samples and improving lab capabilities. In Maryland, the state no longer has formal radon or indoor air quality programs, and thus there is little support to local governments on general IAQ issues.

2. IAQ in Schools

In all of the jurisdictions surveyed, local school systems are responsible for school construction and maintenance activities, and the role of the state in this area

varies considerably. Vermont is actively developing policies to address IAQ activities in schools. Minnesota is notable for providing grants to school districts for health and safety capital improvements, including an explicit category for IAQ-related repairs. This funding mechanism, administered by the state education agency, may help alleviate the pressure on school districts to forego maintenance expenditures in order to fund educational programs. Minnesota's education agency also has provided technical support through its collaboration with regional "service cooperatives," which are wholly owned by the state's school districts.

In Florida, where IAQ problems in schools have received widespread publicity, the state's education agency provides technical support and training to school districts; these activities are limited, however, by resource constraints at the state level. California agencies play a smaller role in this area, though federal and state officials work together to provide training and materials to local school officials.

Although Maryland no longer has an IAQ program, the state education agency has an active program that provides technical guidance and advice to school districts. School systems such as Montgomery County Public Schools, which have relatively large health and safety programs, rely less on the state program. The Montgomery County Public Schools system has addressed IAQ issues actively for a number of years and recently formed a Process Action Team with county officials to look comprehensively at how to identify and resolve IAQ problems in schools.

3. Code Enforcement

The jurisdictions surveyed reflect the variation in practices among state and local governments with respect to building and housing codes. In some cases, the state adopts a building code, but leaves enforcement to local governments. In other cases, local governments may adopt their own code provided it is consistent with, or at least as stringent as, the state code. Building codes are generally enforced through the building permit process. In all states surveyed except Vermont, enforcement takes place exclusively at the local level. The way in which enforcement is carried out thus varies considerably within a state, as well as among states.

III. FACTORS INFLUENCING THE DEVELOPMENT AND IMPLEMENTATION OF STATE IAQ PROGRAMS

The states surveyed differ both in *how* they address indoor air quality issues and on *which* IAQ problems they focus. The establishment of program priorities and activities reflects numerous and often related factors. This section identifies some of the

more significant factors and discusses how they have influenced the programs studied here.

A. The Role of Region-Specific and Highly Publicized IAQ Problems

A state or locality's experience with a specific IAQ problem may have a considerable influence over the development of IAQ programs. In some jurisdictions surveyed, IAQ program activity is motivated by general concern about the potential impacts of poor indoor air quality, including health problems and related workers' compensation costs. In those cases, agency officials and legislators have been able to translate general concern over indoor air quality into legislation and funding for IAQ programs. In other jurisdictions, state programs have been created or expanded following one or more specific incidents that demonstrate the serious health, productivity and financial impacts that result from inattention to indoor air quality. In addition, state programs sometimes are created in response to concern for certain indoor air problems that are unique to, or prevalent in, the state.

In Florida, statewide IAQ problems (generally mold contamination) in new courthouses and schools forced the closure of buildings, affected occupants and required county governments and school systems to spend millions of dollars on remediation. These problems received tremendous media attention in the early 1990's. In the 1993-94 period, the level of administrative and legislative IAQ activity increased; in particular, the state legislature funded the Department of Health's IAQ grants program and passed legislation on IAQ in public buildings. In Vermont, highly publicized cases involving a state building and a local school provided the impetus for the state's far-reaching initiative to develop IAQ policies and programs for state buildings and schools. In Minnesota, the U.S. General Accounting Office's (GAO) ranking of Minnesota's schools as among the worst in indoor air quality sparked public and governmental interest in the issue.

Of the five jurisdictions surveyed, Florida and Minnesota have unique, state-specific or region-specific IAQ problems that have played a major role in focusing state activities. Florida's warm, humid climate means that people spend more time indoors and makes it more difficult to control humidity in buildings. Florida's IAQ programs therefore focus heavily on adequate ventilation and removal of moisture from outside air. In Minnesota, the cold climate also means that people spend a great deal of time indoors. Techniques to ensure energy efficient commercial and residential building conditions may facilitate the concentration of certain contaminants such as radon and

combustion pollutants, and may exacerbate problems such as mold caused by uncontrolled moisture. Minnesota is also facing significant mold problems due to recent flooding, and is expecting to increase its activities to address this issue. In both Florida and Minnesota, certain national standards may not be applicable to solving IAQ problems that are related to climate.

B. The Role of Legislation, Regulations and Standards

Although states generally have not enacted comprehensive IAQ laws, legislation has played an important role in determining the scope and extent of state and local IAQ activities. Most states have enacted laws that address indoor air quality issues. For the most part, these laws are not comprehensive measures that establish a regulatory framework for addressing indoor air quality. This is likely due to a number of factors, including: (1) the wide variety of products, practices and buildings that impact indoor air quality; (2) the existence of multiple agencies with jurisdiction over IAQ issues; (3) the evolving technical and scientific understanding of IAQ problems and solutions; and (4) the lack of legislative and political interest in creating and funding new or expanded areas of regulatory activity.

Some states have enacted general laws that establish an IAQ program with non-regulatory authorities or responsibilities. Most state laws in the U.S., though, tend to focus on one or more discrete aspects of indoor air quality. Common subjects for state laws include asbestos, lead, environmental tobacco smoke and radon. In addition, more than half of the states address indoor air quality through real estate disclosure laws that mandate disclosure of known indoor air contaminants at the time a home is sold. State laws also direct agencies to establish building codes, which typically incorporate IAQ-related provisions such as minimum ventilation requirements. Some states have laws that require state registration or certification of indoor air professionals, though these laws are typically limited to radon service providers.

The enactment of legislation has been a significant factor in the development of IAQ programs in three of the four states surveyed. Appendix B provides a summary of the IAQ-related laws of each jurisdiction. The following paragraphs discuss three of the ways in which legislation has most directly influenced agency programs: by creating an IAQ program and authorizing IAQ activities generally; by requiring an agency to undertake certain IAQ-related program activities; and by facilitating the development of IAQ standards and protocols.

1. Creation of an IAQ Program

The central IAQ program of a state or local government may be based on an agency's general legislative authority to address public health or the environment. This is the case in Minnesota and Vermont, as well as in Montgomery County, Maryland. Other states have laws that specifically authorize the health department or other agency to address indoor air quality activities.

For example, legislation played a key role in launching California's formal IAQ programs. A state law enacted in the early 1980's directed the California Department of Health Services to implement the state's principal IAQ program, which would coordinate IAQ activities in the state. In the mid-1980's, the state legislature passed funding measures specifically to enable the California Air Resources Board to undertake research on indoor exposure to pollutants addressed through the Board's ambient air quality program.

Legislation was also critical to the establishment of Florida's central IAQ program. While the state had been involved in radon research for many years, it was not until 1988, following passage of the state's radon law, that a formal program was created to carry out the provisions of the law. State law also authorizes the Department of Health to implement an IAQ testing and monitoring program to evaluate health risks for exposure to indoor air pollutants.

2. Legislatively Mandated Program Activities

State laws often establish program direction by requiring that state agencies undertake specific IAQ-related activities. IAQ research and education are two of the most common activities provided for in state legislation. California is the most notable example in the area of research. The legislature has enacted laws directing and funding state agencies to undertake general IAQ research as well as specific research projects. As a result, research is a significant IAQ program activity in California, and the state has been a leader in this area. California's IAQ laws also direct its agencies to educate the public about ongoing IAQ research.

In Florida, the Department of Health's Radon and Indoor Air Office concentrates on radon activities outlined in the state law creating the program -- for example, certification of radon professionals and public education. In addition, legislation

allocates IAQ funding specifically for the purpose of carrying out the state's local matching grants program.

3. Promulgation of Administrative Standards and Protocols

While some of the state programs surveyed have published guidance documents to assist building managers and others in identifying, remedying and preventing IAQ problems, there are few regulations that establish mandatory IAQ standards or protocols. Florida's interagency IAQ committee recommended the consideration of stronger workplace IAQ standards, however such standards have not been promulgated. Vermont's interagency task force is considering adopting IAQ-related standards or guidelines for schools and state buildings. One factor contributing to the general lack of regulatory requirements is the evolving scientific and technical understanding of IAQ problems and remedies. In the absence of such requirements, agencies often utilize guidelines published by private groups or by the EPA.

State officials differ in their views as to the need for mandatory IAQ standards. In certain areas -- for example, workplace health standards -- officials note that the lack of adequate regulatory standards has hindered state programs. On the other hand, some officials believe that concern about potential liability is sufficient to motivate the private and public sectors to implement accepted industry standards relating to building construction, maintenance and repair. Most officials surveyed agree on two points. First, there is a need for greater clarity in the standards for evaluating, remedying and preventing IAQ problems, whether those standards are mandatory or voluntary. Second, there is also a need for ongoing training and education of the public, building owners and building professionals on appropriate IAQ standards, protocols and practices.

Appendix C describes the principal IAQ-related regulations of the jurisdictions surveyed. A description of the areas in which IAQ standards have been adopted in the states surveyed follows.

For *new buildings*, building codes are a mechanism for establishing IAQ-related requirements for new construction. In some states, such as California and Minnesota, state-wide energy codes contain IAQ-related provisions. In Florida, the state requires local adoption of one of three model building codes that have been approved (and updated) by the state.

Minimum ventilation requirements are a common IAQ-related feature of building codes in the jurisdictions surveyed. California strengthened its ventilation requirements for non-residential construction following a study of the impact of energy efficiency requirements on IAQ. Minnesota is notable for its current efforts to revise the state Energy Code to mandate the use of mechanical ventilation in residential construction. In 1994, Minnesota modified ASHRAE standard 62-1989 to provide that natural ventilation is not adequate to satisfy the standard in residential buildings, given the cold climate. Also of note, Florida and Montgomery County have promulgated radon-resistant new construction standards. Florida's standards are voluntary unless adopted by local governments; thus far, no local governments have adopted them.

With respect to *existing buildings*, the most common type of IAQ regulations concern occupational exposure limits and general sanitary standards for workplace settings. Most officials surveyed consider occupational exposure limits to be inadequate for addressing indoor air quality problems in non-industrial environments. Some officials note that the absence of national standards in this area is an obstacle to effective state activities. Of the four states surveyed, only Minnesota has adopted its own IAQ-related workplace standards and requirements. Florida's labor agency proposed, but did not adopt, such standards; instead, the agency established guidelines for a number of indoor air contaminants, which it will use as a tool for conducting inspections and providing technical assistance.

California is notable for its 1987 regulation covering workplace requirements for operation, inspection and maintenance of mechanical ventilation systems. This regulation, implemented by the state's labor agency, requires that HVAC systems operate continuously, and to design standards. It also mandates annual inspection of the system by building personnel.

Both Florida and California have adopted regulations relating to indoor pesticide applications. California regulations require notice to occupants before a certified pest control applicator sprays in a building, while Florida education regulations require schools to adopt integrated pest management programs. Minnesota has regulated indoor air pollutants in enclosed arenas for a number of years. Those regulations set limits for carbon monoxide and nitrogen dioxide and establish methods for measuring indoor air quality.

C. The Role of Resources

As in any governmental program, the scope and extent of IAQ activities depends in large measure on available resources. The provision of federal funds and other resources has had a significant impact on the rate of development of IAQ program activities in the states surveyed. Radon programs have received substantial federal (matching) grants and have developed rapidly over the past several years. The availability of federal training resources for local school officials has been a catalyst for increased attention to general IAQ problems in schools. The stationing of an EPA IAQ specialist in Vermont for a four-year period is expected to have a large impact on that state's program.

General state revenues have supported the activities of the states' central IAQ programs. In some cases, special funding mechanisms have been used as well. For several years, Florida collected a new construction surcharge and used the money to fund the state's radon program. Florida also collects certification fees from radon service providers, which are used to support the program.

Outside of the central IAQ programs, state offices that address IAQ issues as part of their broader mission to address health and safety generally do not receive specific funding allocations for their IAQ activities. This often means that indoor air quality must compete with other issues for funds, and the scope of IAQ activity thus reflects whether the agency has established indoor air quality as a priority. The four states studied show substantial variation in the level of staff, equipment and other IAQ resources within agencies responsible for workplaces, schools and state buildings, as well as agencies that adopt building codes and regulate pesticides.

In the jurisdictions surveyed, the availability of state funds for IAQ activities has had a considerable impact on the development of local programs. As noted earlier, Florida has leveraged its IAQ-specific funding by making matching grants to local health department offices, thereby decentralizing the state IAQ program. Minnesota has passed through federal and state funds to local governments to address radon and other indoor air problems. Absent state funding, the creation of general IAQ programs at the local level is more likely in counties and municipalities that have large health or environmental agencies already in place.

Resource limitations have particularly affected IAQ programs in schools, where maintenance and remediation projects are generally funded through local school district budgets. In the competition for funding between indoor air quality projects and educational programs, resources traditionally have gone to the educational programs first. In Minnesota, the state program for funding health and safety capital improvements addresses this dilemma by targeting resources to IAQ-related initiatives.

D. The Role of Individual Leadership

Individual leadership -- both at the management and program staff levels -- plays a particularly important role in IAQ programs, perhaps because of the absence of a detailed legislative and regulatory framework for addressing indoor air pollution. Often this leadership is a reflection of an individual's professional training, background and experience in areas related to indoor air quality. In some of the jurisdictions surveyed the support of management has elevated indoor air quality as a priority within an agency, and the interest and initiative of key staff members have resulted in a greater attention to IAQ issues. This has been the case particularly in agencies that do not have separate funding allocations for IAQ activities, but rather address indoor air as part of their general authority over health, safety or environmental issues. Individual leadership also has been important in state or local programs devoted to indoor air quality, especially if these programs have few staff members and a broad mandate.

E. The Role of Stakeholder Participation

State and local IAQ programs interact with many non-governmental stakeholders, including building occupants, building owners/managers, building professionals and product manufacturers. Building occupants seem to be organized mainly through unions and through health or consumer advocacy groups. Residential tenants usually are not well-organized, and in the states studied they did not appear to be active on general indoor air quality issues. State employees' unions and teachers' unions, as well as groups such as the local or state chapters of the American Lung Association, have been most visible in the four states surveyed. Some state and local programs have sought actively to involve these groups in order to help ensure that agency activities address the concerns and interests of building occupants. In some cases, the groups have worked independently on IAQ education and other projects that supplement governmental efforts.

State and local IAQ officials come into contact with building owners / managers, building professionals (architects, engineers, IAQ evaluation / remediation consultants) and manufacturers of consumer items, appliances and products affecting indoor air quality. These contacts take place in a wide range of situations -- from building-specific (or product-specific) problems to general policy and program matters. Some states in the U.S., including Florida, require certification of professionals providing radon services. None of the states surveyed has established specific certification requirements for general IAQ service providers. For the most part, though, the programs surveyed seek to promote good IAQ practices on the part of these stakeholders through education and technical assistance. Officials point out that this is an ongoing effort, which sometimes requires strategies for changing long-standing industry practices.

In addition to activity-specific contacts, some state and local IAQ programs have established institutional mechanisms for facilitating communication with non-governmental stakeholders and for involving those parties in the ongoing work of the agency. Notable examples include the following:

- *Interagency Task Forces.* Vermont's IAQ task force was created as a result of collaboration between the state and the state employees' union. The task force, which is developing state IAQ policy, now involves the state employees' union, the teachers' union and a children's advocacy group. California's IAQ working group meets quarterly to share information about IAQ activities and is open to non-governmental organizations. In the past, health advocacy groups, private companies and building professionals have participated.

- *Advisory Bodies.* Florida's labor agency has set up a "customer council" comprised of stakeholders on health and safety issues in private and public sector workplaces. This council provides input on general issues and agency programs. In California, the state's labor agency has utilized advisory committees to coordinate the state's response to proposed federal (OSHA) regulations.

- *Green Building Initiatives.* The states surveyed generally have not focused on formal projects promoting green buildings. In Florida, though, the Metropolitan Dade County government has formed a broad-based coalition to promote sustainable buildings and neighborhood development. The Dade Green Coalition is composed of local government agencies, professional associations, trade associations, corporations, individuals and academic institutions. The Coalition holds regular meetings, which are open to the public.

Chapter Three

*

California

I. INTRODUCTION

A. Political and Demographic Features

California's 58 counties cover 158,869 square miles that have been shaped by the waves of the Pacific and volcanic, tectonic, and glacial activity. The state is home to 32,609,000 people, making it the most populated in the nation. California's capital is Sacramento, and its largest cities are Los Angeles, San Diego, San Jose, San Francisco and Long Beach.

B. Geographic Features and Indoor Air Quality Issues

California has had a long standing commitment to the indoor environment. Over the years, its indoor environment programs have addressed individual issues, such as formaldehyde in mobile homes, asbestos in public buildings, carbon monoxide poisoning and legionella. The state has sponsored radon studies that have identified a limited number of regions within the state as high potential radon areas. Environmental tobacco smoke has long been a concern, and IAQ in schools is currently an important issue. California's extensive activities relating to indoor air quality do not appear to be linked to highly publicized IAQ problems, but rather are the result of general concern, interest and commitment to public health on the part of government and the public.

C. Political and Legislative Highlights

California has a long history of political and legislative activity around IAQ issues. California enacted an indoor air quality law in 1982 that established its central IAQ program. That measure granted funding to establish an indoor air quality program in the Department of Health Services (DHS), aimed mainly at conducting research and studies into indoor pollution. In the mid-1980's, a budget provision added resources for the California Air Resources Board to fund research on indoor exposures to pollutants that the Board addresses in its outdoor air quality program.

The early state IAQ legislation directed the DHS to safeguard the public interest "by a coordinated, coherent State effort to protect and enhance the indoor environmental quality in residences, public buildings, and offices in the state." This mandate led to the creation in 1983 of the California Interagency Working Group on Indoor Air Quality, which continues to meet regularly (see Section IX). The group is voluntary and has over 85 members. It meets four times a year to discuss IAQ projects, trends, agency activities, technology and outreach. Presently, the Working Group has two active subcommittees addressing IAQ in schools and building design and operation.

D. Overview of Governmental Structure for Addressing IAQ Issues

Responsibility for addressing indoor air quality issues is distributed among a number of different California agencies, boards and departments. The Department of Health Services and the Air Resources Board house the two principal programs in California that have IAQ as their primary focus. DHS undertakes research and education concerning the identification and reduction of indoor air quality problems generally. The Air Resources Board sponsors research on specific indoor air pollutants and conducts exposure assessment in conjunction with the Board's programs for ambient air pollutants. Both agencies have extensive IAQ programs and work closely with other state, as well as federal and non-governmental, offices.

Other agencies in California carry out IAQ-related activities as part of their broader responsibilities. These include the Department of Industrial Relations (workplaces); the Department of General Services (state buildings); and the California Energy Commission (energy efficiency / ventilation standards).

The IAQ Working Group serves as the central coordinating body for the IAQ-related activities of these and a number of other state offices.

II. CALIFORNIA DEPARTMENT OF HEALTH SERVICES

A. Background

The Department of Health Services plays a lead role in addressing public health issues, and its IAQ responsibilities stem from its public health mandate. The state's

early IAQ legislation established the scope of the Department's functions, which are carried out through various offices within the agency.

The Department of Health Services began addressing indoor air quality issues formally in 1982, following the state legislature's passage of the general indoor air legislation noted in Section I. This legislation required DHS to establish an indoor air quality program in the Department of Health Services and to "conduct and promote the coordination of research, investigations, experiments, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, and control of indoor pollution." Health and Safety Code §105425. The legislature granted DHS the lead in establishing a "coordinated, coherent State effort" to protect the indoor environment. Industrial working environments were specifically excluded from DHS's purview. Health & Safety Code §§105410-105420.

At about the same time, the legislature directed DHS to conduct a "toxic research and information program," part of which would be devoted to developing standard methods for measuring indoor air quality, determining the source of contaminants, and making recommendations for laws or regulations, where appropriate. The law also specifically required the agency to make recommendations regarding the appropriate level of formaldehyde vapors in new mobile homes. Health & Safety Code, §§18615-18616.

In addition to these laws, legislation providing more specific mandates is discussed below, under the DHS branch with jurisdictional authority. IAQ programs are carried out by at least five Branches within DHS: (1) Environmental Health Laboratory Branch; (2) Environmental Health Investigations Branch; (3) Environmental Management Branch; (4) Occupational Health Branch; and (5) the Cancer Control Branch. The IAQ-related work of each of these Branches is described below.

B. Environmental Health Laboratory Branch -- Indoor Air Quality Section

The Environmental Health Laboratory Branch (formerly Air and Industrial Hygiene Laboratory) of DHS houses the Indoor Air Quality Section (IAQS), the state's central IAQ program. The Branch also houses a Biochemistry Section, which performs laboratory research on blood lead levels primarily for the agency's Childhood Lead Poisoning Prevention Program. The Environmental Health Laboratory Branch also

includes an Outdoor Air Quality Section, which conducts research and sampling of outdoor air pollutants, such as vehicle emissions.

1. Background

Origin. The Indoor Air Quality Section was formed following efforts by the former head of the Environmental Health Laboratory Branch to build on the developing need for additional research, information and expertise in the area of indoor air quality. Largely as a result of these efforts, the state enacted legislation mandating the creation of an IAQ program within DHS to coordinate and develop the state's IAQ activities. The 1982 legislation noted that changes in building design, construction and operation, as well as the use of various products, were degrading the indoor environment and causing "mounting danger" to public health. Health & Safety Code §105400.

Jurisdiction. IAQS has responsibility for addressing, through its research and education activities, a broad array of indoor air quality issues. The agency's work is not specific to particular types of buildings or building uses.

Personnel. The IAQS currently employs eight full-time staff members with expertise in ventilation engineering, epidemiology, microbiology, chemistry, psychology, industrial hygiene and public health. These staff members represent about one-third of the total staff of the Branch.

Financial Resources. Funding for staff and support within the Environmental Health Laboratory Branch comes from the DHS budget. The Branch budget includes funds for its three sections, and there is not a specific budget for IAQS. Additional funding for laboratory equipment is available in some years as a separate budget item. The agency makes special requests to the legislature to fund specific research projects.

2. Legislation, Regulations and Standards

As noted above, California's early IAQ laws establish the general scope of the IAQ program within DHS. Health & Safety Code §§105420,105425. In addition, the state has enacted laws directing IAQS to undertake specific research projects. For example, a 1990 law directed DHS to "develop non-binding guidelines for the procedures to reduce VOC exposure in newly constructed buildings and during the remodeling of buildings...." Health & Safety Code §105405.

Another state law, which became effective January 1997, charged DHS and the Department of Housing and Community Development with drafting standards for unvented gas logs and fireplaces. Until such standards are in place, the law prohibits the sale of these devices, as well as other unvented heaters. Health & Safety Code, §19881.

In addition, California's Proposition 65 (the Safe Drinking Water and Toxic Enforcement Act of 1986) has had some application to indoor air quality issues. Although the state Attorney General's office is responsible for enforcing Proposition 65, DHS has acted as an expert consultant. For example, IAQS conducted investigations involving exposure to correction fluid products used in offices. Following a laboratory study of emissions, the agency determined that the product emitted high levels of trichloroethylene (TCE) and thus was potentially covered by Proposition 65. IAQS also has evaluated exposure to nail care products in salons.

3. Activities

IAQS activities fall into one of three categories; (1) research and laboratory investigations; (2) education and outreach; and (3) assistance to the public and other agencies. In addition, IAQS serves as chair and coordinator of the California Interagency Working Group on Indoor Air Quality. As such, it administers working group functions such as announcements, minutes and rosters. In addition, the office published an *Assistance Directory*, which it distributes to agencies that respond to IAQ inquiries. The directory (updated in July, 1997) includes a brief description of 35 public and private agencies and organizations in California that may be able to provide information on IAQ questions. The IAQS is also developing a protocol for responding to questions about indoor air quality.

Research and Laboratory Investigations. The Section has carried out original research, published reports and authored peer-reviewed articles on the following topics:

- Measurement of formaldehyde and nitrogen dioxide in mobile homes;
- Identification of asbestos in public buildings;
- Evaluation of radon concentrations in California residences and schools;
- Survey of accidental deaths due to CO and investigation of risk factors;
- Feasibility and effectiveness of building "bake-outs;"

- Effectiveness of ultraviolet radiation and ventilation to control the spread of airborne infections such as tuberculosis;
- Evaluation of indoor exposure to Proposition 65 chemicals from consumer products;
- Development of guidelines for building managers for preventing Legionnaire's disease;
- Effectiveness of engineering controls for designated smoking areas in public buildings; and
- Determination of allergen concentrations in household dust in homes of asthmatic children.

In July 1996, IAQS released the results of its study, *Reducing Occupant Exposure to Volatile Organic Compounds (VOCs) from Office Building Construction Materials*. This study was undertaken at the direction of a 1990 state law. Also in response to recent legislation, the office is now assembling an advisory group of experts to assist in developing standards on unvented gas heaters, and IAQS will oversee the contract work for their development.

Education, Outreach and Assistance. IAQS provides technical information on indoor air issues in response to requests from the general public, other agencies and county environmental health offices. Approximately 10-15% of staff time is devoted to fielding telephone inquiries and providing consultations. The IAQS may send out literature on a particular issue, or guide an inquiry to the appropriate agency (for example, refer a caller to CAL/OSHA if the problem involves a workplace). Generally, staff members do not make site visits or carry out on-site investigations. On occasion, however, site visits will be made to state-owned buildings or (in unusual cases) private residences. The office also provides a list of private indoor air quality specialists if further investigation is warranted; the list includes background information such as education, years of experience in the field and any licenses held.

IAQS publishes and distributes booklets on various topics, including its *Do-it-yourself Inspection of a Ventilation System*. IAQS is developing an internet website to provide the office's advisories and documents on line.

C. Environmental Health Investigations Branch

The Environmental Health Investigations Branch (EHIB) conducts investigation and surveillance of environmental health problems and indicators. It is considered to be

the assessment arm of DHS's environmental public health program, and consults on toxicological assessment, exposure assessment and epidemiological study design.

1. Background

Origin. EHIB was established in 1980 under the original name, Toxic Chemical Environmental Epidemiology Program. Its objectives were to (1) establish a response team of epidemiologists and other health experts to investigate situations whenever the health of citizens might be in jeopardy because of toxic chemicals in the environment; (2) create systems to monitor environmental contamination from toxic chemicals, and to monitor morbidity and mortality data pertinent to toxic chemicals; and (3) establish priorities for epidemiological studies based on the above objectives.

Jurisdiction. EHIB's jurisdiction covers the effects of chemical and microbiological exposures in the indoor environment. The office's work is not limited to types of buildings or building uses.

Personnel. Within EHIB, IAQ work is performed by one epidemiologist and two staff physicians experienced in environmental epidemiology who devote a portion of their time to this work.

Financial Resources. EHIB's indoor air quality is funded through the DHS general budget.

2. Legislation, Regulations and Standards

The IAQ work of EHIB is authorized by the state's general indoor air quality laws, enacted in 1982. There are no other laws establishing specific IAQ authorities or responsibilities of the office.

3. Activities

Education and Information. EHIB staff respond to inquiries from the public, local environmental health officials, county health officials, or other state agencies. EHIB does not have the laboratory or staff available to do on-site investigations in response to these calls. EHIB primarily advises callers about the health effects of certain molds and bacterial contaminants and how to prevent and eliminate them. For example, EHIB was

involved in a case in which an entire housing subdivision was experiencing bacteria and mold growth problems because of faulty construction. EHIB advised the local health department on the methods of investigation, recommended laboratories for sample testing, and provided literature on solving the problem.

For inquiries involving workplaces, EHIB staff often work with the local Cal/OSHA office and the Occupational Health Branch of DHS.

In addition to handling telephone inquiries, EHIB staff have given talks to school boards and local county or city environmental health departments on the health threats involved in mold contamination.

Research. If inquiries reveal a common problem or trend, EHIB may investigate and track the problem generally. In 1993, for example, EHIB staff conducted a literature search and field investigation on indoor mycotoxins. Branch supervisors had identified many calls involving indoor mycotoxins and believed it warranted more investigation. While the Indoor Air Quality Section of DHS handled inquiries regarding chemical contaminants, little was known about mold exposures. Thus, EHIB provided the expertise in this "niche" field.

Training. EHIB is pursuing efforts to improve county and city health officials' ability to provide services to the public in this area of IAQ contamination. EHIB, along with the Environmental Health Laboratory Branch's IAQ Section, has provided training to industrial hygiene officials on performing site investigations, collecting samples and improving lab capabilities. The Branch hopes that by training local officials, they will be able to better understand if there is a prevalence of certain types of contaminants in the state.

D. Environmental Management Branch -- Radon Program

1. Background

Origin. In 1990, the Governor authorized DHS to apply for a federal (EPA) radon grant, which established the radon program in DHS's Environmental Management Branch.

Personnel. The Radon Program is a one-person office, although some research and support is provided through other offices within the agency.

Financial Resources. The Radon Program is funded by a $125,000 grant from the U.S. EPA, which is matched through state funding of personnel and clerical support.

2. Legislation, Regulations and Standards

In the mid-1980's, the real estate industry worked with the state legislature to pass a law requiring a disclosure statement in connection with residential real estate transactions. Civil Code §1102.6. Under this law, sellers are required to disclose whether they are aware of any "environmental hazard," including specifically radon gas and a number of other indoor pollutants. The law does not provide specifically for state implementations of the law.

In 1992, the legislature established requirements for the certification of radon measurement laboratories, radon testing and consulting specialists and radon mitigation contractors. Health and Safety Code §106750-106865. The Radon Program administers this certification process, which mandates completion of EPA's voluntary proficiency program and requires a fee for certification.

3. Activities

The Radon Program conducts research on the presence of radon gas within California buildings, responds to information requests, provides public education, and administers the certification program for the radon service industry.

Research. In 1990, the Radon Program participated in the joint EPA / state survey on radon levels, which was funded by the California Air Resources Board. Since then, the Program has also performed a school survey and assisted in local surveys. While these studies have concluded that most areas in California have low radon potential, the Program identified a few areas in the state that warranted further investigation. The Program worked with three counties to generate a high radon potential (Zone 1) designation from EPA for those areas. Currently, the Program is working with the local lung associations active in those counties, which include Los Angeles County, Ventura County and Santa Barbara.

Education and Information. In response to requests for information, the Radon Program sends out a pamphlet on radon in California, which was developed a few years ago with EPA Region IX assistance. It may also send out a coupon (from the National Safety Council) for a low cost radon test kit.

The Radon Program provides talks to health and service groups, and has recently designed a large graphic display that will appear in building trade shows and health fairs. The Program will also provide information to local health departments, although little activity is being undertaken at the local level as a result of California's Proposition 13, which required the local health departments to operate on a fee-for-service basis. Health departments located in California's radon "hot spots" are generally more involved in radon issues.

E. Occupational Health Branch -- Hazard Evaluation System and Information Service

The Hazard Evaluation System and Information Service (HESIS) is a joint program sponsored by the state's Department of Industrial Relations and Department of Health Services. While it is physically located in DHS and staffed by DHS employees, it is funded by Cal/OSHA within the Department of Industrial Relations.

Origin. HESIS was established about 15 years ago in response to a chemical tragedy involving workers in a pesticide plant that received extensive media and administration attention. A chemical company was formulating DBCP (a halogenated hydrocarbon), a pesticide used to kill nematodes. Workers at the plant were later discovered to have become sterilized by the chemical, and as expected, public attention focused on the problem of chemical exposures in the workplace. The administration decided that a repository for information on chemicals used in the workplace was needed and subsequently established HESIS.

Jurisdiction. While only a small part of HESIS's work concerns IAQ issues, that work does involve research on chemical air contaminants and infectious organisms which specifically affect indoor air quality.

Because of its origin with the Department of Industrial Relations, HESIS addresses workplace issues only. The office refers inquiries regarding residential issues to other DHS offices, such as the Environmental Health Investigations Branch.

Personnel. HESIS currently has a staff of five full-time equivalent positions. This staff is comprised of a team of toxicologists, physicians, librarians, industrial hygienists, nurses and other occupational health professionals (some of whom work part-time). HESIS estimates that 15-20 percent of staff time is spent on IAQ issues. The office usually has two or three graduate students on work-study programs.

HESIS's staff has fluctuated in numbers over the years depending on the availability of funding. In the past HESIS has had as many as 16 on staff.

Financial Resources. The annual budget for the office is approximately $364,000.

2. Legislation, Regulations and Standards

California law requires the Department of Health Services to establish and maintain a program on occupational health and occupational disease prevention. Health & Safety Code §105175. The law outlines the general functions of the program.

3. Activities

HESIS staff review and evaluate scientific literature and provide an education service to workers, employers and health care professionals on chemical workplace hazards.

Research. HESIS staff systematically review technical journals and file key articles in a computerized bibliography for rapid access. HESIS makes available to the public its extensive occupational health library and provides a slide show and technical module on Indoor Environmental Quality for medical audiences. Research studies in which HESIS is involved include those on flight attendants' health, breast cancer, tuberculosis, and needle stick injuries in health care workers.

Technical Assistance. HESIS provides technical advice to California state and local government agencies. For example, HESIS assists with occupational disease and injury surveillance in collaboration with DHS's Occupational Health Surveillance and Evaluation Program and Occupational Lead Poisoning Prevention Program.

HESIS staff also responds to requests from Cal/OSHA regarding standards and for technical assistance. In consultation with the Cal/OSHA Medical Unit, HESIS may

conduct worksite health hazard evaluations. For example, the office has worked with Cal/OSHA to investigate tuberculosis outbreaks. In such cases, HESIS makes a site visit and looks at records and examines the ventilation systems.

Education and Information. In coordination with Cal/OSHA, HESIS may issue hazard alerts and fact sheets on workplace hazards when warranted. HESIS has designed an internet website as part of the California Department of Industrial Relations website, and all HESIS documents will be available on the federal National Institute for Occupational Safety and Health website beginning in the fall, 1997.

HESIS's telephone response line is advertised to the public. Officials note that many calls from the public concern the effects of workplace chemicals on pregnant women.

F. Cancer Control Branch -- Tobacco Control Section

Environmental tobacco smoke is one of three priority areas of the Tobacco Control Section of the Cancer Control Branch at DHS. The Tobacco Control program was established in 1990 and is funded through a special tax on each pack of cigarettes sold in the state. Proposition 99, approved by California voters in 1988, created the tax and earmarked 20 percent of the new revenues for health education against tobacco use. The Tobacco Control Section's most recent annual budget, which was higher than usual, was approximately $102 million. The Section employs about thirty staff persons.

The Tobacco Control Section has been involved in a state-wide mass media campaign generating television, radio and outdoor advertisements about environmental tobacco smoke. The office works with and supports local partners -- both governmental and non-governmental -- who carry out their own projects. More than half of the office's current annual funding supports these local projects. Local partners include all 61 local health departments in California, as well as numerous non-governmental organizations working in diverse communities around the state.

In the early 1990's, the office focused on assisting efforts to develop local smoking ordinances, which resulted in the passage of about 300 such measures. Funding from the Tobacco Control Section now assists local agencies and groups in implementing state and local smoking laws. The office is also helping local agencies to prepare for the implementation in 1998 of the state's prohibition on smoking in bars.

According to the office, the Tobacco Control Program has had a significant impact on tobacco use in California, as measured in part by the following 1996 statistics:

- 82 percent of California adults agree that exposure to second hand smoke causes lung cancer;
- Virtually all indoor workplaces in California are smoke-free; and
- 63 percent of California adults live in households that have established a smoke-free indoor air policy.

G. Occupational Health Branch -- Occupational Health Surveillance and Evaluation Program

The Occupational Health Surveillance and Evaluation Program (OHSEP) mandate is to conduct surveillance and intervention activities for occupational injury and illness in California. OHSEP responds to requests for consultation and currently conducts surveillance-based research on occupational fatalities, workplace violence, occupational asthma, occupational tuberculosis, agricultural injuries and pesticide poisonings. Projects use a variety of data sources and are funded by state program support, the National Institute for Occupational Safety and Health and the Centers for Disease Control (CDC).

III. CALIFORNIA AIR RESOURCES BOARD

A. Background

The California Air Resources Board (ARB) coordinates the federal ambient air quality program in California, sets state ambient air quality standards and motor vehicle standards, and oversees the state toxic air contaminant program. The local Air Quality Management Districts and Air Pollution Control Districts enforce stationary source controls with oversight by ARB, while ARB enforces motor vehicle emission standards state-wide. For more than a dozen years, ARB has also played an important role in the IAQ arenas through its research and education on indoor air contaminants. ARB is one of six governmental units that were incorporated into the California Environmental Protection Agency when Cal/EPA was founded in the 1990's.

B. Indoor Air Quality and Personal Exposure Assessment Program

Indoor air quality issues are addressed primarily by the Indoor Air Quality and Personal Exposure Assessment Program (Indoor Program), located within ARB's

Research Division. The Indoor Program is a non-regulatory program that sponsors research, develops indoor air quality guidelines, conducts exposure assessment and carries out public education and assistance efforts.

1. Background

Origin. The ARB Indoor Program was created in 1986 by a budget provision that provided resources for funding research on indoor exposure to pollutants addressed through ARB's ambient air quality program. Additional resources were provided later that year, following the enactment of legislation directing ARB to assess the level of potential human exposure to toxic air contaminants in indoor environments as well as in ambient air conditions. This bill was introduced in response to a growing awareness within the legislature and ARB that some pollutants were producing major indoor exposures and that little was known about this issue. Minor additional resources were provided to the program through a budget provision in 1988. Thus, the creation of the Indoor Program was due in large measure to staff and members of the state legislature who were interested in IAQ issues and effective in facilitating the provision of funding for this work.

Jurisdiction. The Air Resources Board's authority over indoor air pollution is closely tied to the agency's jurisdiction over ambient air quality. The Indoor Program has authority to undertake research and exposure assessment for all types of indoor air contaminants, but focuses on those pollutants addressed by ARB's Toxic Air Contaminants Program and Ambient Air Quality Standards Program. This research is not limited to certain types or uses of buildings. However, because Cal/OSHA has exclusive authority over workplace exposures, ARB has focused on residential and public buildings.

Personnel. ARB's Indoor Program currently has 4.5 staff positions, all of which are either air pollution research specialists or air pollution specialists.

Financial Resources. The Program budget funds 4.5 staff positions, plus research contracts which amounted to $439,000 last fiscal year. The program also provides $297,000 per year to the Office of Environmental Health Hazard Assessment (see Section IV) for its indoor air quality risk assessment activities. Funding for the program comes from state taxes.

2. Legislation, Regulations and Standards

The Air Resources Board carries out its indoor air quality and personal exposure research under its general mandate to "coordinate and collect research data on air pollution." Health & Safety Code § 39701. ARB implements state law which mandates that "[i]n evaluating the level of potential human exposure to toxic air contaminants, the state board shall assess the exposure in indoor environments as well as in ambient air conditions." Health & Safety Code §39660.5(a).

State law also mandates that "in assessing human exposure to toxic air contaminants in indoor environments...[ARB] shall identify the relative contribution to total exposure to the contaminant from indoor concentrations, taking into account both ambient and indoor air environments." Health and Safety Code §39660.5(d). The statute further requires ARB to consult with DHS and to refer all data on indoor exposures to toxic pollutants and suspected sources of pollutants to DHS, Cal/OSHA, the California Energy Commission, the Department of Housing and Community Development, and the Department of Consumer Affairs.

A 1988 law gives ARB authority to regulate certain sources of indoor pollution -- products that emit reactive organic compounds. The aim of any regulatory action to reduce such emissions is targeted toward protecting outdoor air, rather than indoor air. Health and Safety Code, §41712.

In 1989, the Air Resources Board produced a report entitled: *Reducing Exposures to Indoor Air Pollutants in California: Existing Authorities and Recommended Actions*. The report noted that while available information indicated that indoor air pollution poses a serious risk to human health, the state lacked a formal state plan or comprehensive process to address IAQ problems. The report included a series of recommendations toward this end. At the same time, the Board adopted Resolution 89-49, in which it reiterated the agency's commitment to developing actions to reduce and prevent exposure to indoor air pollutants. Through the resolution, ARB directed its staff to develop health-based IAQ guidelines for residential indoor environments and to assist other agencies in developing IAQ education programs.

3. Activities

The Indoor Program's principal activities are sponsored research, exposure assessment, development of indoor air quality guidelines, public education, and technical assistance.

Research. Indoor Program-sponsored research has provided important new information for assessing and reducing indoor exposures to pollutants. In carrying out this research, the Program has worked closely with federal, state, and local agencies, as well as research organizations, academic researchers, and non-profit health organizations. For example, the Indoor Program is working with the Lawrence Berkeley National Laboratory on a chamber study to measure emissions from carpet, vinyl flooring, and paints. Other examples of studies and surveys conducted by the Indoor Program include the following.

- ARB has sponsored several pioneering studies of residential levels of toxic pollutants measuring the indoor, outdoor and personal exposure concentrations of VOCs, inhalable particles, toxic metals, ozone and formaldehyde. Two of those studies were jointly funded by ARB and EPA.

- ARB has funded statewide surveys of the activity patterns of children and adults in California, with the primary objective to identify specifically those activities and locations that are most relevant to air pollutant exposures. Data from these studies have been widely used in exposure modeling by both public and private entities.

- In 1994, ARB sponsored a unique study to measure the amount of air people breathe during their normal activities such as driving a car, mowing the lawn and playing. Prior to the study, most measurements had been calculated in laboratory conditions or involved exercising athletes. The results of this study are being used to help further refine exposure and dose estimates.

- ARB currently is funding the development of IAQ samplers for ozone and nitrogen dioxide that are portable, economical, and have a sufficient range of measurement, and thus are suitable for use in large indoor field studies. Previous ARB-sponsored research focused on developing polycyclic aromatic hydrocarbon samplers for the indoor environment.

- ARB also recently has contracted with Research Triangle Institute to study levels of particles, volatile organic chemicals, PAHs, and other pollutants that are present inside vehicles as they travel on California roadways. This study, which is scheduled for September 1997, will provide data on the public's exposures to pollutants while driving and riding in the car.

- ARB has sponsored two chamber emission studies on toxic pollutants, one on environmental tobacco smoke and the other on formaldehyde and toluene diisocyanate emissions from likely indoor sources.

Exposure Assessments. State law charges ARB with assessing Californians' indoor exposures to toxic air contaminants and estimating the relative contribution of indoor concentrations to total air exposures. These assessments are conducted in conjunction with ARB's Toxic Air Contaminants Program, which identifies chemicals as toxic air contaminants and undertakes outdoor exposure assessments. In 1992, the legislature expedited the identification process by requiring the 189 federal Hazardous Air Pollutants listed in the 1990 Clean Air Act Amendments to be identified as toxic air contaminants. The most recent addition to the agency's list of toxic air contaminants was inorganic lead, in early 1997.[1] Thus far, Indoor Program staff have prepared indoor exposure assessments for approximately 15 compounds. ARB's exposure assessments are routinely published for public review, and one or more public workshops are held to answer questions and obtain input from interested parties.

The Air Resources Board also has participated in the California Comparative Risk Project, headed by the Office of Environmental Health Hazard Assessment. That project sought to guide California environmental policy through a ranking of risks to human health and the environment. The Indoor Program provided the project with indoor exposure distributions on 15 indoor pollutants, as well as other exposure assessment research undertaken by the Program. The Project ranked many of these air pollutants in the "high risk" category, including radon, environmental tobacco smoke, volatile organic compounds, consumer products / residential sources, ozone and PM_{10}. A project report was released in 1994.

Public Education Materials. ARB has directed the Indoor Program to develop health-based guidelines for indoor air quality in non-occupational indoor environments. Each guideline covers a single pollutant or group of related pollutants with the purpose of answering commonly asked questions, identifying potential

sources of the pollutant, and explaining what types of action the public can take to reduce their exposure. The Program has published two of these guidelines: *Formaldehyde in the Home*, published in September 1991, and *Combustion Pollutants in Your Home*, published in March 1994.

A guideline on chlorinated hydrocarbons is expected to be completed in late 1997 or early 1998. Another guideline that is being developed covers indoor ozone generated by some computer printers, copiers and some indoor air purifiers, as well as outdoor ozone brought indoors by "swamp coolers" (a type of air conditioner). The Indoor Program is also preparing a guideline on indoor particles and dust. Before being released to the public, these guidelines are reviewed by DHS, the Office of Environmental Health Hazard Assessment, and others.

The Air Resources Board has published other materials for the general public, including a 1993 brochure entitled *Reducing Indoor Air Pollution*. The brochure has been highly acclaimed and in high demand. ARB has also disseminated memoranda describing IAQ products such as indoor formaldehyde monitors and carbon monoxide detectors. The Indoor Program's internet website lists the IAQ guidelines that have been developed by the Program, and provides links to research notes on projects funded by ARB, as well as other information.

Public Inquiries. Approximately one-fourth of Indoor Program staff time is spent on public education and responding to public requests for assistance. Officials estimate that the Program has received an average of 500 calls per year from the public since 1989-90.

About one-half of the calls are from the general public, whose needs can often be met by sending out prepared materials generated by ARB, DHS or EPA, including ARB guidelines and the brochure *Reducing Indoor Air Pollution*. Program staff also use a protocol developed by EPA to walk the caller through a series of questions to help identify the source of a problem. Indoor Program staff also provide members of the public with DHS' list of private IAQ professionals, as needed. The other half of the calls for assistance concern workplaces or public buildings. Staff provide appropriate information and advice and refer these callers to the proper agency, such as a Cal/OSHA office or the Department of General Services.

Coordination with Other Agencies. In addition to participating in the IAQ Working Group and carrying out joint research with other agencies, the ARB Indoor Program works with state agencies on various programs relating to indoor air quality. For example, Indoor Program staff have advised the California Energy Commission on building and ventilation standards. Program staff have also advised Canadian government researchers, testified for U.S. OSHA at hearings on the proposed federal IAQ rule, and served on a wide variety of peer review and advisory panels.

Occasionally, ARB is called by the State Office of Emergency Services when a local fire or health department is unable to address an emergency indoor air problem. The Compliance Division of ARB may be asked to take field samples; however, because that Division is responsible mainly for monitoring ambient air quality, Indoor Program staff may provide guidance as to what pollutants to expect, how to measure them, and what levels are hazardous. A recent episode at a school involved ARB in measuring for suspected carbon monoxide poisoning, with technical assistance provided by Indoor Program staff.

C. Related ARB Programs

Several other ARB programs directly impact indoor air quality as well. These include the Architectural Coatings Program, the Aerosol Coatings Products Program, and the Consumer Products Program. In addition, research sponsored by ARB's Biological Effects Research Program provides important health effects information on both indoor and outdoor pollutants.

The first three programs generally impose limits on the amount of reactive volatile organic chemicals in various coatings and consumer products sold or used in California. The purpose of these program regulations is to reduce emissions of those VOCs to the outdoor air and thus reduce the amount of ozone formed in California's outdoor air. (Reactive organic gases are photochemically reactive and contribute to the formation of ozone outdoors). The Architectural Coatings Program regulates the VOC content of products such as paints, varnishes, and wood preservatives; the Aerosol Coatings Products Program regulates aerosol products such as paints, stains, and clear coatings packaged in disposal cans; and the Consumer Products Program limits the amount of VOCs in a wide variety of products such as detergents and cleaning agents, personal care products, floor polishes and waxes, and disinfectants and sanitizers.

The Biological Effects Research Program has funded a variety of research on air pollutants that can pose major indoor problems as well as outdoor problems, such as carbon monoxide, nitrogen dioxide, and inhalable particles. This program and the Indoor Program have co-funded and worked cooperatively on several major exposure studies, and most recently on a major epidemiology study of the effects of southern California air pollution on children's health. The information generated by these studies is used for many purposes, but is used especially by the Board's Ambient Air Quality Standards (AAQS) Program to review the need for revision of state ambient air quality standards. The Indoor Program provides information on indoor levels of, and exposures to, pollutants addressed by the AAQS Program.

IV. OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

A. Background

The Office of Environmental Health Hazard Assessment (OEHHA) is formally a part of California EPA. Indoor air issues are addressed by the Office's Indoor Air Risk Assessment Group (IARAG), within the Air Toxicology and Epidemiology Section.

B. Indoor Air Risk Assessment Group

1. Background

Origin. IARAG was created in 1994 to provide health effects expertise to ARB, other state agencies and the public.

Jurisdiction. IARAG indoor air research activities focus on individual pollutants and their health effects.

Personnel. IARAG has a staff of four, consisting of scientists and toxicologists.

Financial Resources. IARAG is funded through the ARB budget, which provides $297,000 per year for OEHHA's indoor air quality risk assessment activities.

2. Legislation, Regulations and Standards

IARAG has no specific legislative mandate. Rather, IARAG's work assists the Air Resources Board and other offices within Cal/EPA, as well as other agencies, in implementing the state's IAQ laws.

3. Activities

Development of Risk Assessment Guidelines. The IARAG is responsible for developing guidelines and other documents for the assessment of health risks from indoor air chemicals and chemical mixtures. The office currently is working on indoor air risk assessment guidelines that would help determine at what level short-term exposures to certain air contaminants would cause adverse health effects.

Through an agreement with IARAG, the Lawrence Berkeley National Laboratory recently completed a literature review of IAQ and schools, and developed a study protocol and questionnaire for conducting a symptom survey of teachers. At the present time, however, there are no plans within the state to conduct the teacher survey.

Technical Advice and Support. The group provides technical advice and support to ARB, DHS, professional organizations, and the public on indoor air and related environmental health issues. IARAG has assisted the Indoor Program within ARB in reviewing its indoor air quality guideline, *Combustion Pollutants in the Home*.

OEHHA staff have organized a "Green Building" Committee of prospective tenants of the Elihu Harris State Building, which is under construction in Oakland. The 23-story building, which is scheduled to be completed in April 1998, will house 1,800 state employees, including OEHHA, the Department of Consumer Affairs, the Department of Industrial Relations, and others. OEHHA organized the committee due to staff concerns that indoor air quality in the design and construction of the building had not been adequately addressed. OEHHA staff have drafted a charter for the Committee, which states the group's purpose, action items and recommendations. The Committee is examining whether the building should be "flushed out" before occupancy and making sure that the builders use DHS's 1996 non-binding guidelines, *Reducing Occupant Exposure to VOCs from Office Building Construction Materials.* The Committee is also looking at other green building issues, such as recycling.

V. CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS

A. Background

The Department of Industrial Relations (DIR) is responsible for a variety of labor and employment matters, including workers' compensation, labor standards, apprenticeship standards, labor statistics and occupational safety and health. Within DIR is the California Occupational Safety and Health Program (Cal/OSHA), which addresses safety and health issues in workplaces that are not under federal jurisdiction. The Cal/OSHA program includes the Cal/OSHA Consultation Service, which offers training and consultation to assist employers in complying with health and safety requirements. Enforcement of workplace health and safety requirements is carried out by the Division of Occupational Safety and Health, described in more detail below.

B. Division of Occupational Safety and Health

1. Background

The Division of Occupational Safety and Health (DOSH) enforces the state's occupational health and safety laws and regulations. DOSH has 20 district offices and six regional offices. Some regional offices are based on geographic location, others on a special area of expertise, such as the High Hazard Unit in Region VI or Mining and Tunneling in Region V.

Origin. DOSH has enforced state occupational health and safety requirements for many years. Agency officials note that over the past three years, the Department has responded to increased concern regarding indoor air issues in the workplace.

Jurisdiction. DOSH enforces California's occupational health and safety regulations in public and private workplaces that are not under federal jurisdiction.

Personnel. There are approximately 700 employees within DOSH. Of this total, 300 are safety and health employees, 112 of whom are industrial hygienists with field work responsibility. There are four senior field inspectors. There is no formal tracking of the percentage of time spent by these employees on IAQ issues.

2. Legislation, Regulation and Standards

The Department of Industrial Relations is one of the few state agencies that has regulatory authority over indoor air quality. State regulations govern health and safety in the workplace and incorporate federal OSHA standards.

In 1987, the Department (through its Occupational Safety and Health Standards Board) took the unusual step of adopting a regulation covering workplace requirements for operation, inspection and maintenance of mechanical ventilation systems. California Code of Regulations, Title 8, §5142. The Minimum Ventilation Standard requires that an HVAC system be maintained and operated so as to provide at least the quantity of air it was required to supply at the time the HVAC system received its building permit. The regulation also requires employers to operate the HVAC equipment continuously during working hours, except in certain limited circumstances. This is to prevent employers from affecting the ventilation in a workplace by turning off air conditioning or heating systems to save electricity costs. The regulation also requires the employer to inspect the system annually, and provide documentation of such inspections, to assure adequate ventilation.

The Department of Industrial Relations also has jurisdiction over California's smoking law, which was enacted in 1994. Labor Code §6404.5. The statute prohibits employers from permitting, and individuals from engaging in, the smoking of tobacco products in an enclosed space at a place of employment. Exceptions are made for a hotel rooms, hotel lobbies, hotel meeting places, private smoking lounges, cabs, warehouse facilities, and private residences. The law also allows the designation of "breakrooms" for smokers, provided ventilation and other requirements in the law are met.

3. Activities

DOSH’s primary activity is enforcement of workplace health and safety, including smoking requirements. In addition, DOSH has provided training for its industrial hygienists, some of which has been carried out in conjunction with EPA courses. DOSH works with other agencies through the state's IAQ Working Group, and is represented on a joint committee on Vapor Recovery issues with the California Air Resources Board.

General Health Enforcement. DOSH has authority to investigate IAQ complaints in occupational settings at either the request of an employer or employee or on its own initiative, and may issue citations and penalties for violations of standards.

An employee may file a complaint with one of the Division's 22 district offices. If no name is given by the complainant, it is considered an informal complaint and the employer will initially be contacted by mail. Otherwise, complaints generally elicit a site visit if the problem falls within the Department regulations. For example, if an employee complains that the HVAC system has not been inspected in several years, the district office would investigate. If the employee complains about a temperature problem, about which there are no standards, the district office might refer the complainant to the local health department.

If DOSH tests for air contaminants, but no exceedance is found, the office may consult with the building manager as to proper ventilation and inspection. The office may also suggest that a private IAQ inspector be consulted. According to officials, agency employees will not give out the list of IAQ experts maintained by the Department of Health Services because they have enforcement authority over the employee-employer relationship of all of those companies and do not want to be viewed as favoring one over the other. An inspector may, however, refer the employer to DHS.

Environmental Tobacco Smoke Enforcement. California's smoking law is initially enforced by local law enforcement agencies, including the local health department, as determined by the local governing body. A $100 fine may be imposed for a first violation; $200 and $500 fines are imposed for subsequent violations. DOSH is not required to respond to an environmental tobacco smoke complaint unless the employer has been found guilty of three violations in the previous year. Following three convictions, DOSH also has enforcement authority under California's smoking law. Smoking complaints from employees in state buildings are initially handled by the building supervisors and the Department of General Services.

In response to petitions to the Occupational Safety and Health Standards Board concerning smoking in the workplace and the federal OSHA proposal for an indoor air standards, the Division conducted a series of advisory committee meetings. In this manner, a broad consensus document was developed and submitted as comments to OSHA. The advisory committee's activity has been suspended, as there has been no

additional OSHA regulatory action. In addition to the advisory committee activity, a policy and procedure document was generated to assist Division personnel in responding to complaints and to implement the state smoking law.

VI. CALIFORNIA ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

A. Introduction

The California Energy Resources Conservation and Development Commission (California Energy Commission or CEC) is charged with developing, implementing, and periodically updating energy efficiency standards for new buildings in California. Indoor air quality issues relating to the standards are addressed by CEC's Facilities Siting and Environmental Protection Division.

B. Facilities Siting and Environmental Protection Division

1. Background

Origin. The CEC's indoor air quality program was established in the late 1980's, following the enactment of legislation directing the CEC to address IAQ issues in its work.

Jurisdiction. The CEC has authority to develop energy efficiency standards for residential and non-residential buildings, which incorporate minimum ventilation requirements. CEC directives thus have considerable impacts on indoor air quality.

Personnel. There is one staff person in the Facilities Siting and Environmental Protection Division assigned to monitoring and advising on IAQ issues as part of his duties.

2. Legislation, Regulations and Standards

In the late 1980's, the state legislature enacted two bills to address issues relating to indoor air quality and energy efficiency. The first bill required the CEC to assess the energy savings from its energy efficiency standards, as well as their cost and effectiveness and impacts on indoor air quality. AB 191 (Bradly 1987). The other bill

directed CEC to consider the impacts of these standards on indoor air quality; the measure added section 25402.8 to the Public Resources Code, requiring the CEC to consider any such impacts during all future revisions of the standards. AB 4655 (Tanner 1988).

The California Energy Commission adopted the first of the state's energy efficiency standards for new buildings in 1977. California Code of Regulations, Title 24, Part 6. These standards include minimum ventilation requirements for all new residential and non-residential buildings, including state-owned buildings. The standards, which are enforced by local building departments, have been revised every two to five years by the CEC.

During the 1992 revision, the Commission conducted an assessment of the impacts of its energy efficiency standards on indoor air quality, and concluded that substantial revisions to the non-residential ventilation requirements were needed. The standards currently require a minimum ventilation rate equal to the larger of (1) 0.15 cfm per square foot of floor area (for most building uses) or (2) 15 cfm per occupant multiplied by the expected number of occupants. These standards also allow for performance based ("demand-controlled") ventilation to improve system effectiveness. California Code of Regulations, Title 24, Part 6, §121. The CEC determined that since the state building code requirements for residential ventilation have always exceeded comparable requirements in ASHRAE Standard 62, no additional ventilation requirements were needed in the Energy Efficiency Code with regard to residential buildings. The Code does, though, contain related requirements, such as those regarding the installation of vapor barriers. California Code of Regulations, Title 24, Part 6, §150(g).

The CEC is currently updating its 1995 Energy Efficiency Code, which will be revised in 1998. That revision is not expected to change existing requirements for building ventilation.

3. Activities

In addition to promulgating regulations that have a significant impact on indoor air quality, the CEC monitors developments in the IAQ field and proposes appropriate studies when warranted by research findings.

As a result of the legislative mandates of the 1980's to study the state's energy efficiency standards on indoor air quality, the CEC contracted for and funded several studies on ventilation adequacy. These studies were designed to measure the ventilation rate in buildings before and after energy efficiency standards were put into effect. In December 1994, the CEC presented its findings to the state legislature in a report entitled *California's Energy Efficiency Standards and Indoor Air Quality*.

The report concluded that no change was needed in the energy efficiency standards because ventilation was adequate when systems are correctly installed and maintained. The CEC believes that high-level exposures to indoor air pollutants usually result from either the presence of unusually strong sources of pollutants or ineffective delivery of the ventilation air. The ineffectiveness of the ventilation, however, is caused by either inappropriate operation or maintenance, or failure to use the building as designed, rather than by inadequate ventilation standards. The report was reviewed by DHS, ARB, EPA and other members of the IAQ Working Group. The report also provides information on how CEC considers the need for acceptable indoor air in developing its energy conservation standards for new buildings.

The CEC has participated in the IAQ Working Group for many years, along with other interagency efforts to address specific IAQ-related issues.

VII. CALIFORNIA DEPARTMENT OF GENERAL SERVICES

A. Background

The California Department of General Services (DGS) has jurisdiction over the operation and maintenance of state-owned buildings. It also provides telecommunications, printing, procurement, fleets and other services. Of the approximately 20,000 state-owned buildings in California, DGS has jurisdiction over about 200. The others are operated and maintained by the state departments who own the building, some of whom contract out the management work.

As a result of a perceived fragmentation of responsibility over state buildings, the DGS reorganized in July, 1997 to combine the former divisions of the State Architect, Real Estate Services, and Buildings and Grounds, into one division now called the Real Estate Services Division. Indoor air quality concerns are being

addressed by the Professional Services Branch and the Building and Property Management Branch within that new division.

B. Building and Property Management Branch

1. Background

Jurisdiction. The Building and Property Management Branch (BPM) has responsibility over the operation and maintenance of the state facilities owned by DGS, including warehouses, parking garages, and approximately 200 office buildings.

Personnel. BPM oversees approximately 1200 employees located throughout the buildings under its jurisdiction, including building managers, supervisors, maintenance workers, janitors, groundskeepers, engineers, electricians, plumbers, and carpenters. Within BPM there are currently two staff persons (under Environmental Health and Safety Services) who handle many indoor air quality issues. These staff persons spend approximately 10-25 percent of their time on general IAQ issues. The remainder of their time is spent addressing a broad range of specific environmental health and safety issues, including ergonomics, asbestos management, and lead-based paint.

2. Legislation, Regulations and Standards

BPM uses DOSH standards for air contaminants levels, but these standards are not always applicable to indoor office environments. State buildings are also required to follow the Minimum Ventilation Standard adopted by the Department of Industrial Relations, which requires the continuous operation of the ventilation system during working hours and an annual inspection. According to state officials, most state building managers do a good job of meeting this standard. However, this standard may not be sufficient for office buildings that also house laboratories and use the space in ways not anticipated in the original design.

BPM uses ASHRAE ventilation standards for the ventilation systems to determine the adequate number of air changes and air filter efficiency, among other system requirements.

3. Activities

Technical Assistance. BPM responds to state employee complaints concerning IAQ in the state buildings under DGS jurisdiction, An IAQ complaint is first channeled to the Building Services Officer, who usually investigates immediately. If the immediate cause and solution cannot be found, BPM will visit the building to interview tenants, find out their concerns, inspect the work area ventilation, inspect the janitorial materials, and inspect the ventilation system. After an investigation of the problem, BPM will make the necessary corrections to the system or make recommendations as to how to correct or minimize the problem.

Training. BPM provides training for its operations and maintenance staff. Most of the building managers, stationary engineers and chief engineering supervisors have attended the EPA training course on building air quality. This course was presented three or four years ago and was co-sponsored by the state's IAQ Working Group. Since then, these staff members have been offered one- and two-day workshops on various IAQ issues. Two years ago janitorial supervisors attended workshops on "healthy buildings," which discussed janitorial issues such as the appropriate use of various vacuuming systems, aerosols, and other cleaning chemicals. BPM recently trained 15 employees in the new lead-based paint construction standards.

Development of Guidance Documents. According to agency officials, BPM is beginning to make inroads into establishing protocols for building managers to use in their maintenance and operation, although they are not being implemented universally. BPM has provided building managers with recommendations on how to substitute for products with lowest VOC emissions. This recommendation, however, is often subject to the needs of a particular client in the building or to the decision of the procurement office. BPM has had some discussions with other offices to seek wider implementation of these protocols.

Development of No-smoking Policies. Employees in California's state buildings have long been concerned with the effects of environmental tobacco smoke. In the late 1980's, the Governor issued an Executive Order that limited smoking in state buildings to certain designated areas. The Department of General Services was charged with developing and implementing a smoking policy. In the early 1990's, a no-smoking policy in state buildings was written by BPM health and safety staff, who also spent two years educating state employees and negotiating with the union in the implementation

of the policy. The EPA Region IX IAQ coordinator provided significant help in this effort. In 1993, the Governor issued the DGS policy in an Executive Order that banned smoking in state buildings, with a few minor exceptions for prisons and other places. The next year, the state enacted its law limiting smoking in private workplaces as well. Complaints related to the smoking policy are handled by the building managers, who generally rely on education and negotiation to handle disputes.

C. Professional Services Branch -- Design Services Section

The Professional Services Branch / Design Services Section develops the design plans and specifications for state facilities. The mechanical engineering section within the office is involved in designing ventilation systems. The office follows the California Building Code and the California Mechanical Code, as well as the state's Energy Code.

VIII. OTHER AGENCIES

A number of other agencies participate in the IAQ Working Group and have limited involvement in indoor air quality issues. In addition to the agencies described briefly below, Working Group participants include the Department of Economic Opportunity and the Department of Toxic Substance Control.

A. Department of Education

Local school districts in California are autonomous entities. The California Department of Education has responsibilities in the areas of educational policy, curriculum, finance and accountability. The Department has one person who spends a small portion of her time on indoor air quality issues, mainly through IAQ Working Group activities. In 1995, the Department published a booklet titled "Indoor Air Quality: A Guide for Educators." The 10-page guide outlines general management procedures and design considerations for addressing IAQ issues in schools.

B. Department of Housing and Community Development

The California Department of Housing and Community Development (DHCD) implements programs in the areas of affordable housing and economic development. Through its Division of Codes and Standards, the agency is responsible for the adoption and administration of rules and regulations governing the construction, use,

maintenance and occupancy of residential housing. The housing codes adopted by DHCD are in turn adopted by California cities and counties for enforcement at the local level, mainly through the permit process. Health & Safety Code §§17920 *et seq.*

While the state housing code and regulations do not directly address indoor air quality issues, their maintenance requirements might cover certain indoor air quality problems.[2] According to agency officials, the DHCD does little work on IAQ issues, primarily because of budget restrictions. Through its representation on the IAQ Working Group, the DHCD seeks to keep informed of current indoor air issues relating to the adoption and enforcement of building codes.

C. Department of Pesticide Regulations

The Department of Pesticide Regulations is responsible for evaluating and mitigating the environmental and human health impacts of pesticide use. Its activities include pesticide registration, and the identification and promotion of alternative pest management systems. The Department's Worker Health and Safety Branch carries out pesticide exposure assessments as part of its risk assessment projects. The office reviews the effects of indoor exposure to pesticides resulting from indoor applications, as well as applications on nearby fields. The agency has jurisdiction to enforce federal and state pesticide laws and regulations. Department regulations require pesticide applicators to obtain the owner's consent before "directly discharging pesticides onto a property," and also require generally that persons undertaking pest control give notice to property owners before applying pesticides. California Code of Regulations, Title 3 §§6616, 6618. With respect to indoor application of pesticides, the Department's notification requirements are satisfied by compliance with similar requirements enforced by the Department of Consumer Affairs.

D. Department of Consumer Affairs

The Department of Consumer Affairs (DCA) is charged with protecting the public from deceptive trade practices. In 1982, the agency issued the first comprehensive review of indoor pollution by a state agency. Although the agency does not have enforcement power directly over consumer products or practices that affect indoor air quality, the agency has issued consumer warnings about unvented residential combustion heaters. The Department of Consumer Affairs also licenses and regulates a number of professions, including cosmetologists and cosmetology

establishments. The agency conducts inspections and can suspend or revoke licenses to practice and to operate a business.

While DCA does not currently license IAQ professionals, the agency does regulate pest control professionals. The agency enforces the state Structural Pest Control Act, requiring that registered structural pest control companies provide owners or tenants with prior written notice of the application of pesticides on the property. Business and Professions Code §8538. The notification must include a statement about pesticides generally, and a list of telephone numbers to call if occupants experience health effects following the application. Violation of this requirement is punishable as a misdemeanor.

E. University of California System

The various programs at the University of California's campuses provide assistance to employees and unions on indoor air issues and serve as a regional resource for the evaluation and treatment of occupational and environmental health conditions. For example, the Occupational Medicine Clinic at the UC-San Francisco is available to see or give advice regarding medical symptoms associated with IAQ symptoms.

IX. THE CALIFORNIA INTERAGENCY WORKING GROUP

The California Interagency Working Group on Indoor Air Quality has over 85 members representing state, federal and local agencies, as well as public interest groups and private organizations, with IAQ oversight or interests. It is a voluntary group that meets to help its members fulfill their own mandates. The IAQ Working Group serves three functions; (1) an information clearinghouse; (2) a forum for discussion, collaboration and education; and (3) a platform for collaboration among state agencies with shared, specific concerns (e.g., environmental health in school environments).

The IAQ Working Group is inclusive; any agency or organization with an interest in IAQ is welcome to participate. State agency members include:

- Department of Health Services (chair);
- Department of Industrial Relations;
- Department of General Services;
- Department of Education;

- California Air Resources Board;
- Office of Environmental Health Hazard Assessment; and
- California Energy Commission.

Participants outside state government organizations include the American Lung Association and the Lawrence Berkeley National Laboratory. The University of California is also represented, as are local health departments and county school superintendents.

The IAQ Working Group meets four times each year (March, June, September, and December), alternating between Berkeley and Sacramento. The meetings provide a forum for discussion, collaboration and education on indoor environmental quality, building engineering and related health effects in the IAQ area. The agencies represented report on their activities during the quarterly meetings. These minutes are written up by the Department of Health Services and distributed to all members.

Currently, there are two active committees of the Working Group: Indoor Environmental Quality in Schools and Building Design and Operations.

Committee on Indoor Environmental Quality in Schools. In December, 1996, the Committee on Indoor Environmental Quality in Schools released an *Advisory on Relocatable and Renovated Classrooms*, which discusses the IAQ concerns over the purchase or lease of relocatable classrooms (or portables) and over the renovation of classrooms. The quality of air in classroom portables became an issue after the legislature mandated a reduction in class size, which resulted in greater demand for portables. The Committee generated the document to advise school facility managers on how to minimize potential health impacts from indoor air problems in implementing the class size reduction program. The six-page document discusses design, construction and maintenance issues. The Committee mailed the *Advisory* to the superintendents of approximately 1,000 school districts statewide in early January, 1997. EPA will also be distributing the *Advisory* at its future IAQ training programs in California.

In June, 1997, the Committee prepared its final draft report: *Indoor Environmental Quality in California Schools: An Initial Assessment of Status and Needs: A Technical Memorandum for Policymakers.* The report is being reviewed by outside experts and will be submitted by committee members to their agencies for approval and for consideration of agency action.

Committee on Building Design and Operation. The Committee on Building Design and Operations was formed in the fall of 1996. The Committee has submitted comments on ASHRAE's Draft Standard 62-1989R: Ventilation for Acceptable Indoor Air Quality. It also has reviewed the Department of Health Services' non-binding guidelines on VOCs from office building construction materials.

X. LOCAL GOVERNMENT ACTIVITY

County Boards of Supervisors are directed by statute to "take measures as may be necessary to preserve and protect the public health," which generally is accomplished by local health departments. Health and Safety Code §101025. Many city governments also have their own health departments. Most of these departments do not have funding for a separate IAQ program, and refer IAQ questions to the state Department of Health Services. In some cases, the county health department may investigate a specific indoor air related problem under its general authority over health concerns.

A. Merced County Department of Health

The Merced County Department of Health, Division of Environmental Health, has authority to investigate health and sanitary conditions in residences under the Uniform Housing Code, which states that there should be no unsanitary conditions in a housing unit. The Department has one staff person working on IAQ issues, who spent 535 hours in FY 1996-97 addressing these problems. Most of this time involved complaints of mold and fungus in building units. While the county has no enforcement authority in this area, the staff person can provide information and assistance in response to callers.

On occasion, the Department may do an on-site investigation if the situation warrants. For example, two years ago the Department began getting complaints from people living in the same subdivision with a mold and fungus problem. Staff visited between 40-50 homes over the last two years and took slide samples which were then sent to a lab. The Department sent the homeowners the lab results and information on bioaerosols. Because there were no standards on acceptable levels, however, the agency was unable to make any recommendations as to whether the residents should move or not.

B. Ventura County - Environmental Health Division

Ventura County has one staff person who spends about 15 percent of her time on IAQ issues, mostly on radon awareness issues. Ventura County is a Zone 1 (high radon potential) area. The staff person continues to work with the building industry to encourage them to incorporate radon resistant features in new construction. She provides radon information to the public at health fairs, schools and community club meetings, and distributes radon test kit coupons or radon test kits, if available. She has attended radon training workshops sponsored by the National Association of Counties, the National Environmental Health Association and EPA. She has also attended training sessions on IAQ issues related to biological contaminants sponsored by EPA.

With respect to questions from the public about IAQ issues not related to radon, the staff person will provide American Lung Association pamphlets and refer the caller to DHS's Indoor Air Quality Section if unable to assist the callers. The state list of private IAQ companies is also provided to the caller if requested.

Ventura County's main obstacle to doing more in the IAQ field is funding. The Environmental Health Division is unable to offer programs that are not funded or mandated by the state. Ventura County has been able to provide a limited radon awareness program through National Association of Counties grants.

XI. OBSERVATIONS

A. Structure and Focus of State IAQ Programs

Many different state agencies in California have some involvement with indoor air quality issues. The dominant focus of state activity has been on research and the development of related guidance documents for use by governmental and non-governmental stakeholders.

Jurisdiction

California has two state agencies (DHS and ARB) that house programs addressing IAQ issues broadly and that focus on research and education activities. The Department of Industrial Relations (Cal/OSHA), the California Energy Commission,

the Department of General Services and other offices also have important IAQ programs.

In 1982, the state legislature designated the Department of Health Services as the lead IAQ agency. Through its central IAQ program -- the Indoor Air Quality Section of the Environmental Health Laboratory Branch -- as well as offices in five other branches of the agency, DHS undertakes many research projects on indoor air quality. IAQ's jurisdiction to address indoor air pollution is not limited to certain pollutants or certain types of buildings (though industrial workplaces are excluded from its mandate). The program's research activities have been extensive and broad in scope and have resulted in publication of various types of materials on indoor air pollutants. In addition to the IAQS program, DHS offices carry out research and provide information to the public and local officials on specific issues such as radon; biological contaminants in the air, building components and furnishings; and chemical air contaminants and infectious organisms in workplace.

The Air Resources Board also plays a prominent part in indoor air issues. Beginning in the 1980's, the legislature funded ARB to carry out a research program on indoor air pollution. ARB's role, through its Indoor Program, consists mainly of research and development of materials relating to exposure to indoor air contaminants.

The Department of Health Services and the Air Resources Board started their programs in the early and mid-1980's. The two agencies now each have well-established programs that emphasize research and information dissemination. While ARB's research authority for IAQ is largely related to its authority over ambient air pollutants, DHS's authority over the indoor environment is broader, more public health-oriented and not restricted to air issues. Whereas ARB research tends to focus on assessment of exposures to those indoor air pollutants that are also outdoor air pollutants, DHS's work addresses the investigation, measurement and reduction of indoor air pollution more generally. DHS research projects are often initiated in response to requests from other agencies that are addressing IAQ issues in carrying out their general functions. Another Cal/EPA agency, the Office of Environmental Health Hazard Assessment, works closely with ARB and focuses on indoor air risk assessment. This Office assists DHS and other agencies as needed.

Other state agencies have regulatory authorities with respect to indoor air quality. The Department of Industrial Relations (through Cal/OSHA) is charged with

enforcing California's occupational health requirements, including any relating to indoor air quality, in public and private workplaces. In addition to enforcing federal OSHA standards, the agency has responsibility for enforcing the state's requirements governing ventilation system maintenance and smoking in the workplace. The California Energy Commission is responsible for adopting energy efficiency standards, including ventilation requirements, and for reviewing the impact of those standards on indoor air quality.

The Department of General Services has a managerial function with respect to indoor air quality. DGS addresses IAQ issues in the construction and maintenance of state-owned and leased buildings. The agency responds directly to employee complaints, as well as provides training and guidance to building managers.

Interagency Coordination

The principal organization that brings together California's diverse agencies is the IAQ Working Group, a voluntary group first convened by DHS in 1983 following passage of the state's early IAQ legislation. While the IAQ Working Group does not function as a formal coordinating body, the Working Group fosters communication and coordination among agencies that address various aspects of indoor air quality and serves as a key source of information for all state agencies. The Working Group also has functioned as a vehicle for different agencies to work together in developing their projects.

Because there are so many offices with some IAQ responsibilities, there are numerous opportunities for interagency collaboration on projects. Both ARB and DHS, which have broad research and education authorities, are responsible generally for working with other state agencies on IAQ issues. Some state laws explicitly call on agencies to coordinate their IAQ activities. For example, state law directs DHS to establish a "coordinated, coherent State effort" to protect the indoor environment. State law also directs ARB's Indoor Program to consult with DHS and to refer all data on indoor exposures to toxic pollutants and suspected sources of pollutants to DHS, Cal/OSHA, the California Energy Commission, the Department of Housing and Community Development, and the Department of Consumer Affairs.

In addition, certain state agencies provide staff and financial resources to other state offices, and thus collaborate on a more formal level -- for example, DHS (HESIS)

and DIR (Cal/OSHA), and ARB and the Office of Environmental Health Hazard Assessment. Also, ARB provided funding to DHS for the first statewide radon study in the late 1980's.

Activities

California's IAQ-related activities have involved a broad range of indoor air pollutants in residential and non-residential indoor environments. Most prominent among the state's activities have been its research projects. State law mandates and funds extensive research activity on IAQ issues. DHS has undertaken research on biological aerosols, environmental tobacco smoke, and consumer product emissions, among other things. Notable examples of the research undertaken by the Air Resources Board include a number of studies of residential exposure concentrations of VOCs, inhalable particles and toxic metals. The Air Resources Board has found through its studies and exposure assessments that indoor exposures to many air pollutants exceed outdoor exposures, and constitute a "very significant risk."

Some California agencies and offices have issued regulations relating to indoor air quality (see Section XI B, below). In addition, some of California's IAQ programs have been developing non-binding protocols and guidelines designed to improve the way in which governmental and non-governmental parties address IAQ issues. For example:

- ARB has directed its Indoor Program to develop health-based guidelines for indoor air quality in non-occupational indoor environments. So far, the Program has published two of these guidelines, on formaldehyde and combustion pollutants.

- DHS's Indoor Air Quality Section has produced non-binding guidelines for procedures to reduce VOC exposure in newly constructed buildings and during the remodeling of buildings. The office has also produced a do-it-yourself guide to ventilation system inspection.

- The Department of General Services is establishing protocols for state building managers to use in their maintenance and operations activities.

While state IAQ program offices provide the public and other agencies with information and general advice on IAQ problems, there has been relatively little emphasis on providing technical assistance to facilitate the resolution of site-specific

IAQ problems, either through field investigations or telephone consultation. According to state officials, this is due in part to the absence of a legislative mandate to provide this type of service, and in part to a lack of funding. The major exception to this has been in the area of occupational health: the Department of Industrial Relations has funding for technical assistance and consultation, and the Department of General Services responds to state employee complaints about indoor air quality. The Department of Health Services has compiled a list of private IAQ consultants in the state who can address site-specific IAQ problems.

California's IAQ activities concerning schools have occurred mostly in the context of the IAQ Working Group. The Working Group has recently completed a draft report assessing the status and needs of IAQ programs in schools; this report may lead to a greater level of activity at the state level -- both inside and outside of the Department of Education -- in the future. The Working Group also issued a guidance document on IAQ issues for relocatable and renovated classrooms.

State-Local Relationships

Indoor air quality activity at the local level in California is limited by reductions in state funding and by the requirement in Proposition 13 that local agencies operate on a fee-for-service basis. Areas such as indoor air quality that are neither mandated nor funded by the state have few local resources. Thus, while state agencies have only limited authority and funding to conduct IAQ site investigations and provide site-specific technical advice, county and city governments may also lack resources to respond to IAQ complaints or inquiries at the local level.

Many state agencies seek to provide local government officials with information and assistance relating to indoor air quality activities. For example, local health departments, which often lack funding for a separate IAQ program, consult with or refer callers to the state Department of Health Services. Within DHS, the HESIS office provides technical advice to local government agencies. The Environmental Health Investigations Branch has provided training to industrial hygiene officials on performing site investigations, collecting samples and improving lab capabilities.

Some state IAQ-related laws and regulations establish a local enforcement scheme. Under California's workplace smoking law, local law enforcement agencies are responsible for initial enforcement response. The CEC's energy efficiency standards for

new buildings are adopted by local governments and enforced by the local building departments.

B. Selected Factors Influencing the Development and Implementation of California Programs

California's Indoor Air Problems

California has addressed certain indoor air quality problems for many years. Legislative interest and executive branch activity in the 1980's does not appear to be a reaction to a particular IAQ problem or case, but rather to growing concern generally over IAQ issues. One exception to this is the HESIS program, which was established within DHS about 15 years ago in response to a highly-publicized chemical tragedy involving workers in a pesticide plant.

Legislation, Regulations and Standards

California has enacted numerous laws that deal expressly with indoor air quality issues. Most of California's formal agency programs on indoor air quality have been either established or guided in large measure by legislation. State laws both outline the general focus of IAQ programs and direct agencies to undertake specific IAQ-related activities.

California's early IAQ legislation established the Department of Health Services as the central indoor air agency in the state, responsible primarily for conducting research and coordinating IAQ activities at the state level. A few years later, the legislature provided resources for the Air Resources Board to undertake IAQ research as well. In the late 1980's, the legislature directed the CEC to incorporate indoor air quality issues in its work, and led to the creation of that agency's indoor air quality program.

California's laws have focused on IAQ research, by either establishing research as the focus of agency work or directing an agency to undertake specific research projects. One of the most recent state IAQ laws, which took effect in January, 1997, directed DHS and the state Department of Housing and Community Development to coordinate the drafting of standards for unvented gas heaters. In addition, California's Proposition 65 (the Safe Drinking Water and Toxic Enforcement Act of 1986) has had some application to indoor air quality issues. The state Attorney General's office is responsible for

enforcing Proposition 65, however DHS has acted as an expert consultant on implementation of the law.

Another significant piece of IAQ legislation is a 1988 law directing the California Energy Commission to consider the impacts of its energy efficiency standards on indoor air quality. The state energy efficiency code incorporates minimum ventilation requirements applicable to both non-residential and residential buildings.

One unique feature of California's IAQ programs is the establishment in 1987 of regulatory requirements for the operation, inspection and maintenance of mechanical ventilation systems in workplaces. These requirements were adopted as part of the state's OSHA regulations.

State-Federal Relationships

EPA's Region IX office has considerable involvement in California's IAQ activities. The IAQ Working Group provides a key opportunity for Region IX to share information about EPA-sponsored materials and programs and to establish a basis for ongoing communication with individual programs.

EPA has been particularly active on issues relating to indoor air quality in schools, chiefly through providing and sponsoring IAQ Tools for Schools training and materials to local school officials. EPA also has distributed to school officials a manual on integrated pest management in schools.

Federal funding has also played a role in the development of California's IAQ programs. For example, the DHS radon program is supported by an EPA matching grant. The Air Resources Board has participated in, and provided funding for, a number of federal-state funded research projects.

Stakeholder Participation

The IAQ Working Group provides an ongoing mechanism for stakeholder participation in the state's indoor air quality programs. Both private sector companies and non-profit organizations (e.g., the American Lung Association) have been part of the Working Group.

Organizations such as the American Lung Association have played a significant role in addressing IAQ in schools, an area that has not been a dominant focus of state programs. Other non-governmental organizations -- mostly research institutes -- have worked with state agencies in various research projects. In 1994, the Air Resources Board sponsored an Indoor Air Quality Symposium that was attended by government officials and staff from all levels, members of the private sector and public interest organizations.

Resources

California has allocated significant funding to IAQ activities over the past 15 years. This funding has supported mainly technical and support staff for offices working exclusively on indoor air quality issues, as well as research contracts let out by those agencies. California officials have also been successful at obtaining grants outside state government to support their research and other activities.

Interagency funding arrangements also affect indoor air programs. The Hazard Evaluation System and Information Service (HESIS), for example, is a joint program of DHS and the Department of Industrial Relations. While it is physically located in DHS and staffed by DHS employees, it is funded by Cal/OSHA within the Department of Industrial Relations. In addition, the Air Resources Board has funded three to four positions at the Office of Environmental Health Hazard Assessment to support indoor air quality risk assessment activities.

While funding has been particularly critical to supporting the extensive research activities undertaken by state agencies, there are many IAQ-related programs vying for state funding. Funding constraints which have affected all state programs, have played a part in limiting other IAQ activities. For example, Department of Housing and Community Development officials note that budget restrictions limit the amount of work the agency does on IAQ issues.

Funding constraints are also a significant obstacle to greater IAQ activity at the local level in California. As noted above, local governments are generally limited to carrying out programs that are either funded or mandated by the state. The lack of IAQ resources at the local level has put additional pressure on the state programs to provide assistance directly to public, commercial and agency stakeholders.

ENDNOTES

1.ARB officials note that given the fact that airborne exposure to lead is not generally the most important route of exposure, the agency will be working with other agencies and parties in a risk management workgroup to identify effective actions to further reduce Californians' risk from lead.

2.For example, the code provides that the agency may take action if a building is determined to be unsafe due to inadequate maintenance, in accordance with the latest edition of the Uniform Building Code, or due to lack of (or improper maintenance of) required ventilating equipment. California Health and Safety Code §§17920.3(a)(k).

Chapter Four

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Florida

I. INTRODUCTION

A. Political and Demographic Features

Florida covers 58,167 square miles in the southeastern United States, 100 miles north of the tropics. According to figures from 1992, 13.4 million people live in Florida, making it the fourth most populated state in the U.S. Florida is divided into 67 counties, with the majority of people residing in major metropolitan areas, including Miami, Fort Lauderdale, Tampa-St. Petersburg, Jacksonville, Orlando, and Tallahassee, the state capital.

B. Geographic Features and Indoor Air Quality Issues

Florida's indoor air quality problems are closely linked to the state's semi-tropical, humid climate. Most general indoor air quality problems in Florida involve inadequate design or maintenance of a building's air handling system and water intrusion into building structures. Often, these systems do not adequately remove moisture from incoming air. Biological allergens are among Florida's chief indoor air pollutants. Some researchers have estimated that 80 percent of Florida's IAQ problems are due to heavy mold growth compared to 20 percent nationwide.[1] Some state officials note that these problems are particularly serious during hurricane season and result in a larger number of indoor air complaints.

In addition to mold and other microbial growth, state officials note that volatile organic compounds are significant indoor air pollutants in Florida. Radon potential is high in several regions of the state, including areas in central Florida with phosphate deposits. Research has shown that pesticide use is particularly high in Florida, where over 90 percent of households use pesticides and an average of four pesticides are used in each home.[2]

C. Political and Legislative Highlights

The Florida legislature was one of the first in the country to address radon in a comprehensive fashion, passing a broad radon law in 1988. That law outlines and creates mechanisms for funding a variety of state radon activities. Florida was also one of the first states to pass a law restricting smoking in public buildings and providing enforcement mechanisms.

In addition to radon and environmental tobacco smoke, general indoor air quality issues have received increased public attention over the past several years. In the early 1990's, IAQ problems in schools were the subject of frequent media coverage and a number of lawsuits filed against school districts. Perhaps even more important in focusing attention on indoor air quality were the serious mold problems that arose in new courthouse buildings in Polk, Martin and other counties. These problems, which shut down the buildings, required millions of dollars of local funds to correct and were widely publicized throughout the state.

In 1994, the state legislature passed a measure, House Bill 251, aimed at addressing indoor air quality in public buildings. The law called on the state executive branch to develop recommendations for improving indoor air quality in state owned or leased buildings, schools and workplaces -- more than 390 million square feet in about 49,000 buildings.[3] The result of this bill was a set of proposals developed by an Indoor Air Quality Committee composed of nine state agencies and one non-governmental organization, the Florida Education Association / United. The proposals, which did not address radon, asbestos or environmental tobacco smoke, were contained in a report presented to the Florida legislature on January 1, 1995 and covered:

- Evaluation and prioritization of buildings;
- Stronger workplace regulations (e.g., mandatory standards for new construction, standards for the correction of known IAQ deficiencies in existing buildings, and contaminant and environmental levels); and
- IAQ training, education and information.

Thus far, no legislation has been enacted (or administrative regulations adopted) to implement the proposals.

The Indoor Air Quality Committee also conducted a survey of Florida school districts, community colleges, universities and state agencies. This survey provides

some information on the nature and scope of IAQ problems in Florida's public buildings. For example, the survey found that 65 percent of those responding have had IAQ problems, yet only a very small percentage had formally adopted written policies and procedures to handle IAQ problems.[4]

In 1996, the Florida Legislature conducted a review of Florida's indoor air programs. The Legislature's Office of Program Policy Analysis and Government Accountability (OPPAGA) issued a report of its findings in January, 1997. The report addresses (1) whether the state is effectively controlling the risks associated with indoor air quality; and (2) whether additional laws or regulations are needed. The report focuses on individual pollutants and notes that Florida has adopted regulations addressing "three of the biggest (IAQ) risks" -- environmental tobacco smoke, radon and asbestos. The report goes on to state that "while other unregulated contaminants pose some risks, those risks cannot be accurately estimated," and that "identifying and correcting indoor air quality problems for currently unregulated contaminants is both difficult and extremely expensive."[5]

The report concludes that the current non-regulatory approach of state programs -- emphasizing technical assistance and guidance rather than new regulation -- is appropriate and consistent with EPA policy. Citing the low financial payments for workers compensation claims related to IAQ problems, the report also states that "given the relatively low risk of indoor air quality problems in state-owned buildings, extensive testing and modifications would not be cost-effective." OPPAGA recommends that state agencies continue to monitor indoor air quality problems in order to protect public health and that the Department of Labor and Employment Security closely monitor workers' compensation claims relating to indoor air problems.

D. Overview of Governmental Structure for Addressing IAQ Issues

State jurisdiction over IAQ issues in Florida is divided among several agencies. The Department of Health's Radon and Indoor Air Office deals most directly and broadly with the subjects covered in this report. Another agency that plays a key role in IAQ issues is the Department of Labor and Employment Security, which has regulatory authority over IAQ matters in the workplace. Other agencies with significant indoor air activities are: the Department of Facilities Management Services, which exercises a managerial function over state-owned and leased buildings; and the Department of Education, which assists public schools and community colleges in addressing IAQ

issues. Additional state agencies -- including the Department of Environmental Protection, the Department of Community Affairs, and the Department of Agriculture -- address indoor air quality to a lesser extent.

Neither the state legislature nor the executive branch has designated or funded a coordinating body for these diverse state agencies. The 1997 OPPAGA report found "little or no duplication of service or program jurisdiction" and found that agencies collaborate on their efforts.[6] Several members of the Indoor Air Quality Committee -- including the Radon and Indoor Air Office, and the Departments of Labor, Education, Environmental Protection, and Management Services -- have continued to meet informally to consult on IAQ issues. These agency officials have considered options for developing a memorandum of understanding to establish an interagency technical committee for IAQ issues and to develop a standardized approach to addressing IAQ problems. However, the group currently exists without formal statutory or regulatory authority.

According to agency officials, another useful tool for interagency and interstate coordination are quarterly conference calls organized by EPA's Region IV office. Approximately 35 state indoor air officials from throughout Region IV participate in the calls to share experiences and information about specific problems and program activities. The conference calls also occasionally provide a forum for invited guests to speak on particular topics of concern.

The following sections describe the way in which Florida's laws and agencies address indoor air quality issues. The final section of this chapter provides a review of the key features of the state program.

II. FLORIDA DEPARTMENT OF HEALTH

A. Introduction

The Florida Department of Health engages in clinical, preventive and environmental health programs. Prior to January 1, 1997, these programs were part of the Department of Health and Rehabilitative Services, an agency that employed over 40,000 staff and included the state's social and welfare programs. Since the reorganization, environmental health issues such as indoor air are located within a much smaller Department of Health.

The Department of Health's Bureau of Environmental Toxicology has primary responsibility for indoor air quality issues. Within the Bureau of Environmental Toxicology is the Radon and Indoor Air Office, the state's central office on indoor air quality issues. The state office on lead poisoning is also located in this Bureau.

B. Radon and Indoor Air Office

1. Background

Creation. Florida has been addressing radon issues since about 1975. Initially, this work focused on scientific research. The radon program was established formally during the period 1988-89 following passage of a comprehensive state radon law. The indoor air program was established in mid-1994. As of October 1, 1997, the Radon and Indoor Air Office assumed responsibility for enforcing Florida's smoking law. Prior to that date, the state's Clean Indoor Air Act program was located within the Department of Health's Bureau of Epidemiology.

Jurisdiction. The Radon and Indoor Air Office has jurisdiction over a variety of indoor air quality issues. Whereas general IAQ issues are addressed by a number of state agencies, RIA has exclusive responsibility to address radon, regardless of building type. The one notable exception is the Department of Community Affairs, which has jurisdiction to issue and update radon-resistant building standards and guidance for mitigating existing buildings. (See Section VI A.)

The Radon and Indoor Air Office addresses the principal IAQ problems in Florida, including biological contaminants, volatile organic compounds and particulates, as well as environmental tobacco smoke. The office also responds to health-related complaints about pesticides. Due to limited resources, the office does not address odors. In addition, certain indoor air pollutants are covered by other agencies or offices, and are explicitly <u>not</u> covered by RIA's work -- principally lead and asbestos.

RIA's general IAQ activities concentrate primarily on residential buildings. This focus is reflected in a 1993 Memorandum of Agreement between the Department of Health and the Department of Labor and Employment Security (DLES). The MOA provides that in the area of indoor air quality, "DLES shall have jurisdiction over buildings which are primarily workplaces .... [while the Department of Health] shall have jurisdiction over buildings which are primarily residences." This division of

responsibility may result in both agencies sharing jurisdiction over certain types of buildings; for example, with respect to schools, RIA responds to complaints from the public (parents or students), while DLES responds to complaints from school employees. In general, though, this interagency agreement has resulted in fewer indoor air investigations by the Department of Health concerning buildings that are workplaces.

Other state agencies share responsibility for government-owned buildings. For example, the Department of Facilities Management addresses indoor air problems in government-owned buildings, and the Department of Education plays a role in addressing indoor air problems in schools. As is discussed further below, RIA supports and assists these and other state agencies in carrying out indoor air quality-related activities.

According to RIA officials, the Office's activities may address IAQ problems in large-scale commercial buildings as well as in residences, but the agency generally relies on the private sector to address specific indoor air quality problems in private commercial properties, if possible.

Personnel. Currently 14 full-time technical and support staff persons work within the Radon and Indoor Air Office. In addition to the director of the office, 10 staff members address radon and general IAQ issues, while three staff members are responsible for enforcing the state smoking law.

Radon and IAQ staff members respond to telephone calls from the public for information and assistance (2), conduct field investigations (3), certify radon professionals (2), and provide administrative support (3). RIA has maintained roughly this staffing level for radon and IAQ activities since its inception. When the office opened in 1988-89, staff worked exclusively on radon issues. Approximately one year later, an additional staff person was hired to address general IAQ issues.

Until 1995, one human services program specialist was responsible for enforcing the smoking law. That person was, and continues to be, funded through a contract with Florida State University. Two additional staff, a senior human services program specialist and an administrative secretary, were added within the Department of Health at the end of 1995.

Financial Resources. The Radon and Indoor Air Office's annual budget is approximately $1.3 million.

RIA's annual budget for radon-related activities is approximately $599,000. This amount has not changed significantly since the office was established in 1988, although the source of the funding has changed. When RIA was formed, its radon activities were funded in part through a surcharge on new construction. This surcharge was mandated by legislation that established the radon-related functions of the office. The law provided for phasing out the surcharge following adoption of radon resistant building codes in Florida, and the surcharge was terminated in 1994. RIA's funding is now derived in part from federal grants, and in part from construction permit surcharges and fees (including radon certification fees, which the department is required to collect pursuant to state law).

In addition to this funding, RIA has received an annual appropriation of roughly $350,000 for general indoor air quality activities since 1994. This appropriation followed sustained efforts by agency officials to fund non-radon IAQ work. The appropriation has been used exclusively to fund a state grants program to local health department offices (see below). Each year the agency submits funding requests to the legislature to increase the funding for this program, in order to expand the program to cover all counties in the state.

The remainder of RIA's budget is used for enforcement of the state smoking law. Prior to 1995, the only funding source for enforcing the smoking law was a health block grant from the federal Department of Health and Human Services, which continues to fund the Florida State University contract position. In 1995, state general revenue funds were allocated for enforcement of the smoking law, leading to the addition of two staff positions. According to agency officials, this allocation was largely the result of lobbying efforts from non-governmental health organizations.

2. Legislation, Regulations and Standards

The Radon and Indoor Air Office is charged with implementing the state's radon law. Fla. Stat. §404.056. This law was enacted in 1988 and is notable for its broad scope. In particular, the law:

- Requires the Department of Health to carry out a radon public education program;

- Authorizes the Department of Health to establish environmental radiation standards for buildings and conduct programs designed to reduce human exposure to harmful environmental radiation;
- Requires state certification of persons who perform radon measurement and mitigation, and authorizes the Department of Health to operate a fee-based certification program;
- Requires certain buildings (schools, state-licensed day care centers and certain 24-hour care facilities) to test for radon every five years;
- Establishes a surcharge on new construction or renovation, in order to fund the radon-related activities of the Department of Health (later phased out);
- Requires that a generic statement about radon be provided to purchasers or lessors of residential property at or prior to the time of contracting or leasing the property; and
- Establishes the Florida Coordinating Council on Radon Protection to foster efficient use of resources and information for addressing radon (later phased out).

The Department of Health has adopted regulations implementing the radon certification and testing requirements of this law. Fla. Admin. Code, Chapter 64E-5, Part XII. The regulations also establish a maximum annual average radon decay product concentration of 0.02 working levels (including background) in buildings. F.A.C. Chap. 64E-5, Part X4.

In the area of indoor air quality generally, state legislation authorizes the Department of Health to undertake an "indoor air quality testing and monitoring program to assess health risks from exposure to chemical, physical, and biological agents in the indoor environment." Florida Statutes §381.006(2). Other provisions of this law call for epidemiological functions which may relate to IAQ issues, but which fall outside of RIA's jurisdiction. Another state law authorizes the Department to require the removal of "sanitary nuisances," which are defined as acts which may threaten or impair "health or life" or cause disease. Fla. Stat. §386.01.

Another important IAQ law is the Florida Clean Indoor Air Act, enacted in 1985. Fla. Stat. §386.201 *et seq.* In 1988, the legislature formally gave the Department of Health authority to enforce the law. In 1992, after a concerted effort on the part of the Department of Health and other parties, the law was amended to cover additional buildings such as shopping centers and educational facilities. The Department adopted administrative rules to enforce the law in 1989. F.A.C., Chap. 10D-105.

The law prohibits smoking in public places, except in designated smoking areas. It contains some restrictions on the designation of smoking areas. In addition, if smoking areas are designated in public buildings, the law requires that existing physical barriers and ventilation systems be used to minimize smoke in adjacent non-smoking areas; however, the law does not require building modifications, new equipment, or the operation of any existing equipment in a way that decreases energy efficiency or increases electrical demand. Included in the law's definition of "public places" are government buildings, restaurants, retail stores, educational facilities, workplaces, etc. The law prohibits the designation of smoking areas in certain types of public places. Employers must develop, post and implement a policy regarding designation of smoking and non-smoking areas; employers who make "reasonable efforts" to do so are deemed in compliance with the law.

Department of Health administrative rules spell out in more detail the enforcement authority provided in the smoking law. The rules describe the procedures for investigating complaints and responding to alleged violators; conducting on-site investigations of public places; and assessing fines. First offenses may be fined up to $100; repeat offenses may be fined up to $500. Funds received from fines are targeted for children's medical services programs within the Department of Health.

In 1997, the legislature considered, but did not enact, a measure allowing local jurisdictions to pass smoking laws that were more stringent than the state laws, by repealing the state law's preemption clause. The measure was supported by several local governments and non-governmental health organizations, as well as by the Governor. Another measure that has been introduced in the legislature, a ban on smoking in restaurants, has generated substantial opposition from restaurant and tobacco associations, and has not been enacted. Certain non-governmental groups, including the Tri-Agency Coalition on Smoking OR Health[7] and the Tobacco-Free Florida Coalition, have been strong advocates for strengthening the smoking law, as well as for effective implementation and enforcement.

3. Activities

While radon is addressed almost entirely at the state level in Florida, other IAQ issues are addressed primarily at the local (county) level. Thus, the Radon and Indoor Air Office's radon activities differ substantially from its general indoor air quality activities. Moreover, the office’s activities in the area of environmental tobacco smoke

are largely contained within the Clean Indoor Air Act program, recently moved to the Radon and Indoor Air Office. The activities of the radon, IAQ and Clean Indoor Air Act programs are discussed separately in order to emphasize the distinct orientations of the programs.

Radon Activities. Florida's radon program operates pursuant to the state radon law, and the activities of RIA follow from the authority and mandates of the legislation. Thus, the radon program serves a public education and assistance function, as well as a more traditional regulatory function with respect to the certification of radon professionals. According to officials, the agency operates a state-wide program, with additional emphasis in areas of known high radon potential.

The nature of radon activities at the local level varies, depending on factors such as resources, extent of radon problems and degree of public concern over radon. For example, in Polk County, an area of high radon potential, the local health department has been working on radon issues for a number of years. The health department has performed radon testing in all county schools, and has facilitated testing in residences. In Palm Beach County, where high radon levels have not been prevalent, the local health department answers questions and provides information, but generally utilizes the Office of Radon and Indoor Air to address radon issues.

Technical Assistance. The Radon and Indoor Air Office responds to public requests for assistance in addressing a radon problem in homes and in large scale public buildings. Inspectors can make site visits to investigate building-specific problems.

Education/Outreach. The Office responds to public requests for information on radon. A hotline operated by the office answers questions and provides written materials. Officials estimate that office staff make between 50 and 100 public presentations on radon (and IAQ) issues each year.

Certification. RIA runs a certification program for radon measurement and mitigation professionals. The Office is authorized to ensure compliance with certification requirements and has issued regulations detailing those requirements. Florida Administrative Code, Chapter 64E-5, Parts 10&12. According to agency officials, RIA works with the state Attorney General's office to address fraudulent activities.

Radon Testing/Enforcement. The Department of Health has limited authority to implement the statutory requirement for radon testing by schools, day care centers and 24-hour care facilities. (The law explicitly provides that funds from the new construction surcharge may not be used to implement this aspect of the law.) The law requires that the Department establish testing procedures for these facilities, and the Department re-issued its testing rules as "Mandatory Radon Testing Protocols" in 1996. Test results must be submitted to the Department, and the law implicitly authorizes the agency to reject tests that do not comply with agency procedures. The radon law does not, however, establish sanctions for non-compliance.

RIA implements the testing requirements primarily through writing letters to facilities that have not submitted test results as required under the law. Agency officials report that almost all public schools and about 60 percent of private schools have undertaken testing in a timely fashion. According to officials, the response rate from day care facilities has been good, although many of Florida's day care facilities are licensed by local governments and are not covered by the radon law. RIA follows up with schools that have tested positively for high radon levels, and agency officials estimate that approximately 77 percent of those buildings have mitigated the problem.

General Indoor Air Quality Activities. The key feature of the Department of Health's general IAQ program is its decentralized structure. The state's general indoor air quality program focuses primarily on three activities: a matching grants program to local health department offices, technical support and back-up to local agencies, and direct public assistance. The office also responds to requests for public presentations on IAQ issues.

Grants. The Department of Health receives state funding earmarked for IAQ grants to local health departments around the state. In Florida, county health departments are supported by state Department of Health funding and their employees are considered to be state employees. The local health departments also receive funding from the county government and other sources; the county allocations often account for important differences in programs among county health departments. The Department of Health's indoor air quality funding is passed through to the local health offices in the form of grants requiring a 50 percent match from any source. Some county offices share resources and address IAQ issues on a regional basis. According to state officials, there are currently 12 fully funded local IAQ programs incorporating 29 counties and approximately 75 percent of the state's population. Officials indicate that

all but a handful of the remaining 38 local offices have at least an IAQ contact person. The greatest concentration of resources and activity with respect to IAQ issues is in the peninsular portion of the state -- the more urbanized counties south of the city of Ocala.

State IAQ grants are generally between $20-30,000. While grant money is used for a variety of activities, it principally funds local health department employees who respond to public requests for assistance on IAQ matters. Some county offices have two or three people who are equipped to handle IAQ issues. The emphasis of the state/local program is on facilitating resolution of individual IAQ problems. Local health agencies generally seek to evaluate and diagnose IAQ problems and make recommendations on how to address the problems.

According to state officials, county health offices respond to public requests for assistance by providing information over the telephone or investigating a problem by a visit to the building. State officials estimate that county governments have a one to two-day response time for building investigations, and can address 75 percent of the cases with a walk-through of the building.

As noted above, the Department of Health always submits legislative budget requests to increase funding. Such an increase would enable the agency to extend the grants program to all counties and to add one technical staff position within the central program office for IAQ-related activities.

Technical Support and Back-up to Local Officials. RIA provides technical support to local IAQ program officials chiefly in three ways. First, the state consults with local health department officials by telephone on specific cases or problems. Second, the state conducts technical training sessions for local officials. Third, the state helps obtain free education and training resources from outside the state -- e.g., from educational facilities that are sponsoring seminars or from the federal government. The state office has more advanced measurement equipment and occasionally makes this equipment available to local officials.

Direct Assistance/Investigations. RIA provides direct assistance on individual IAQ problems through its Indoor Air Assistance Program. The program covers primarily residences, but also addresses student/parent complaints regarding schools,[8] and cooperates with other agencies to provide technical assistance in buildings outside this area of focus. Because the office has limited resources, it has established priorities for

taking on cases. For example, the office generally only investigates IAQ problems that staff believe are a probable cause of a health problem.

Beyond this determination, RIA staff assist mainly on cases involving problems that are difficult or controversial, or that have received considerable public attention. For example, the office played a role in investigating the well-publicized cases involving the Polk County and Martin County courthouses. RIA also assists on cases in counties that do not have an IAQ program or staff that can respond to public requests for assistance.

This direct assistance takes the form of providing materials or telephone consultation, making referrals to other agencies, consulting with other professionals about a problem, or performing an IAQ evaluation. IAQ evaluations involve a visit to the building itself, where RIA staff perform a "Level One" or "Level Two" investigation according to protocols established by the office. These investigations typically involve direct readings of various IAQ indicators (such as relative humidity and temperature) rather than sampling and subsequent laboratory analysis.

The goal of RIA direct assistance (and of local health department assistance as well) is to facilitate the process of solving a building's IAQ problem. RIA seeks to identify the problem and suggest a technical solution. It is the responsibility of the property owner to pursue, and pay for, the technical solution. In general, RIA does not have authority to require that property owners take particular actions to mitigate an IAQ problem, absent an imminent public health risk. Moreover, agency officials note that the office lacks sufficient resources to follow up an investigation to determine whether a problem has been resolved.

Although the state generally does not focus its technical assistance on IAQ problems in privately owned commercial buildings, RIA has recently compiled a resource list of private companies that provide IAQ services. The office's emphasis on residential buildings has been based on the view that there is an adequate supply of private IAQ professionals, and that commercial property owners -- as well as government agencies -- are in a position to hire private companies to address problems in their buildings.

RIA has not maintained a data tracking system for its direct assistance cases, however the office is now developing scannable investigation forms that will assist the office in comparing, resolving and understanding the types of problems they address.

Interagency Support. RIA is the only state office devoted solely to indoor air quality issues. The office is thus a central contact point for other state agencies that address IAQ concerns in buildings under their jurisdiction. Over the past several years, RIA staff have provided technical support, through consultation and joint investigation, to the state agencies described later in this chapter.

Clean Indoor Air Act Program Activities. The principal activities of the Radon and Indoor Air Office in the area of environmental tobacco smoke are enforcement and education related to the state's Clean Indoor Air Act.

Enforcement. The Department of Health has authority to enforce the state smoking law in public buildings as defined by the law, except for restaurants and hotels, where enforcement is the responsibility of the Florida Department of Business and Professional Regulation (see Section VD). Enforcement is complaint-driven. Following a complaint, the Clean Indoor Air Act program will generally send a letter to the alleged violator requesting a copy of the smoking policy within 30 days. Included with the letter is a copy of a "complaint form" describing the complaint and a copy of the smoking law. If the alleged violator returns its policy and explains what action is being taken to address the complaint, the case will be closed if the alleged violator is in compliance with the law. If no response is received or if the violations persist, a second compliance letter is sent prior to initiating an inspection of the premises.[9]

If a complaint continues following written and telephone contact with the alleged violator, Clean Indoor Air Act program staff will contact the local health department to request an inspection of the premises. If the inspection reveals that a violation of the law exists, the Department of Health can: (1) grant the violator an extension to correct the problem within a short period of time (followed by reinspection); or (2) initiate a fining process. The fining process involves issuance of an administrative penalty order that can be enforced in court. In 1996, for example, the agency received fines totaling $1,525 from four companies.

Florida's smoking law calls on local health departments to conduct inspections to verify compliance with the law.

Education and training. Over the past year, the Clean Indoor Air Act program (while housed in the Bureau of Epidemiology) has held six workshops for county environmental health inspectors who are charged with carrying out inspections under

the law. The program has also provided workshops for the seven district offices of the Department of Business and Professional Regulation, which enforces the smoking law in restaurants.

The Clean Indoor Air Act program office advertises and operates a hotline (1-800-337-3742 in Florida) that handles telephone requests for information, as well as complaints under the law. The program has developed a brochure describing the law, which it sends out along with a copy of the statute. In addition, staff make presentations on the law upon request of civic groups.

The program has worked fairly closely with non-governmental organizations, in particular the Tri-Agency Coalition on Smoking OR Health and the Tobacco-Free Florida Coalition. Staff attend meetings organized by these groups and provide copies of the agency's quarterly updates on enforcement of the law. The organizations advertise the state's toll free hotline and make referrals to the state on complaints under the law.

4. Program Evaluation

The Clean Indoor Air Act program has maintained and compiled information on agency enforcement of the smoking law. Quarterly reports provide statistics on the number of public inquiries / agency response; the number of complaints filed / agency response; and the number of administrative proceedings instituted / agency resolution. The program also tracks the number of calls to the toll-free hotline and the area codes of the callers.

The Florida legislature has required state agencies, including the Department of Health, to begin using "performance-based budgeting" as of Fiscal Year '99. Thus, beginning in 1998, RIA will be developing indicators for its performance and will be establishing measurable goals for its programs.

III. FLORIDA DEPARTMENT OF LABOR AND EMPLOYMENT SECURITY

A. Introduction

The Department of Labor and Employment Security (DLES) addresses a wide array of labor and employment issues. The Division of Safety, one of six divisions within the agency, is responsible for workplace health and safety issues. The health issues incorporate broad indoor environmental quality concerns, including indoor air quality.

B. Division of Safety

1. Background

Creation. The Division of Safety's mission is "to assist employers in making the workplace safer and more healthful, thereby reducing the incidence of occupational injuries, illnesses and fatalities." While the Division of Safety has existed for many years, officials note that the agency's health and indoor air quality activities increased beginning in 1993 and 1994. This was due in part to the highly publicized IAQ problems affecting county courthouses, as well as the rising numbers of workers' compensation claims relating to indoor air quality. It was during this period that the agency decided to use existing funding to purchase industrial hygiene equipment. According to agency officials, the agency was also motivated by federal government (OSHA) efforts to propose indoor air quality regulations governing the workplace.

Jurisdiction. As noted earlier, DLES signed a Memorandum of Agreement with the Department of Health in 1993 distributing jurisdiction over IAQ activities. DLES is responsible for addressing IAQ in private and public sector workplaces, including schools.

Personnel. In addition to the central office in Tallahassee, the Division of Safety has five district offices throughout the state. The Division employs approximately 175 people statewide. At the central office, staff oversee the Division's programs, coordinate the district offices, and provide technical and policy assistance. Approximately 30 people in the field offices are trained to respond to industrial hygiene

and health problems. A senior safety and health analyst at the main office in Tallahassee coordinates training, equipment use, and policy regarding the provision of IAQ services.

Financial Resources. The annual budget for the Division of Safety is approximately $10 million. Of this total, $9 million is derived from the state workers' compensation trust fund and $1 million is received in federal funding. There is not a separate allocation for indoor air quality issues. Safety issues have traditionally been a larger focus than health issues. One agency official estimates that the field employees trained to respond to IAQ problems spend approximately 30 percent of their time on all health issues combined, and the remainder of the time on safety issues.

2. Legislation, Regulation and Standards

Florida law incorporates federal (OSHA) workplace health and safety requirements, and the Division of Safety enforces these requirements in public workplaces.[10] The state has also adopted rules requiring certain private employers to have workplace safety committees.

In 1994-95, DLES proposed a rule establishing indoor air quality standards in non-industrial workplaces. Through the rule, the agency sought to adapt national IAQ guidelines (ASHRAE ventilation standards, among others) to the particular conditions in Florida that affect indoor air quality. According to agency officials, the business community strongly opposed the rule, and it was never promulgated. Although the agency issued the standards as "guidelines," the Division of Safety recently developed a slightly different set of benchmarks to serve as indicators of contamination in non-industrial workplaces when conducting IAQ assessments. It uses these as guidance in determining when there may be an indoor air problem in a workplace that requires further investigation into the source of the problem.[11] The agency is also guided by the ASHRAE 62-1989 and 55-1992 standards and by EPA's *Building Air Quality: A Guide for Building Owners and Facility Managers.*

The Division of Safety helped draft DLES' comments on OSHA's proposed indoor air quality rule. Officials noted that additional OSHA regulation in this area would be useful but that such a measure should focus less on environmental tobacco smoke and more on other indoor air contaminants.

3. Activities

The Division of Safety's chief IAQ activities are building investigations and consultation with employers. The Division also conducts training and education programs. According to agency officials, IAQ-related enforcement is limited by the lack of adequate standards. The agency sought to address this in 1994 and 1995 through its proposed administrative rules.

Investigation and consultation. The Division of Safety implements Florida's workplace health regulations in the state's public workplaces -- state, city and county agencies as well as quasi-governmental entities such as airport authorities. The agency has enforcement authority to ensure compliance with these standards. It also has the power to enforce the state-promulgated standard requiring workplace safety committees in certain private sector businesses.

The Division of Safety also conducts a "7C1" program, funded through the federal Occupational Safety and Health Administration, to provide technical consultation to the private sector on health and safety issues, including IAQ. Under this program, the state does not have enforcement authority, but is required to refer violations to the federal government if the employer fails to correct the problem. The program focuses mainly on assisting businesses with fewer than 250 employees. The Division also operates a parallel, state-funded consultative program for private employers; that program offers technical consultation and does not require referral of violations to OSHA.

The Division of Safety's investigation and consultation activities are undertaken primarily in response to requests for consultative services from employers and complaints from employees. Upon receipt of a request or complaint, agency staff (usually from the DLES field offices) generally conduct a visual inspection. For private businesses, the Division must receive permission from the employers to gain access for an inspection. Based on the results of the visual inspection, the office may measure certain environmental factors or contaminants, e.g., CO, CO_2, respirable dust, temperature, relative humidity or VOCs. Agency officials indicate that the office generally follows standard industrial hygiene (NIOSH) practices and EPA's recommended protocols for taking measurements. After determining the cause of the

problem, the agency recommends technical approaches that can be undertaken by building management. Except in the case of public buildings found to be in violation of state (OSHA) workplace standards, the Division cannot require an employer to correct a problem.

Training and Education. Training is viewed by the Division of Safety as a important IAQ function. The office has developed and delivered courses on IAQ issues for facility managers from the private sector as well as from public buildings such as schools. These courses cover various types of IAQ problems and techniques for resolving those problems. The Division also has tailored workshops to address the IAQ interests and concerns of members of large private organizations or associations. The Division has developed and disseminated Technical Assistance Papers on various topics, including indoor air quality.

Advisory Bodies. The Division of Safety has developed a "customer council" that functions as an advisory body. This is a state-level council, which addresses public sector and private sector employment issues. In addition, there are regional councils in each District that focus on local issues. The councils provide an opportunity for the public to provide input on programs and policies of the agency, including IAQ-related issues.

IV. DEPARTMENT OF EDUCATION

A. Background

The Florida Department of Education's programs cover a broad range of issues affecting the state's 67 school districts and 28 community colleges. Indoor air quality problems in schools are addressed primarily by the Bureau of Educational Facilities.

B. Bureau of Educational Facilities

1. Background

Creation. The increase in public concern over indoor air quality issues in Florida during the past several years has been due in part to indoor air problems at numerous

schools throughout the state. In well-publicized cases during the early 1990's, students and teachers complained of a variety of health symptoms and school officials invested considerable resources to correct indoor air quality problems. In Palm Beach County alone, 24 schools filed complaints about dirt, mold and mildew during a three-year period.[12] These cases were the subject of numerous newspaper articles on indoor air quality problems in schools. In general, government and the public alike believe that indoor air quality problems are extensive in schools throughout the state. As with other types of buildings, the problems are often due to inadequate design of air handling systems in new schools or inadequate maintenance of those systems in existing schools.

Jurisdiction. The Bureau of Educational Facilities addresses a broad range of IAQ problems in schools, including lead paint, pesticides and asbestos, as well as sanitation and hazardous materials usage. The Office does assist with radon in schools, which is covered by the Department of Health.

Personnel. The Bureau of Educational Facilities has been affected by recent budget cuts within the state. Over the past two to three years, the office has gone from 80 employees to about 18. One staff member is directly responsible for IAQ issues, however his time is divided among IAQ and numerous non-IAQ issues.

Financial Resources. For the most part, no state funds are allocated specifically for state activities to address indoor air quality in schools. The University of Florida, in cooperation with the Department of Education, received a grant from EPA to work on integrated pest management in schools.

The operations of individual school districts, including IAQ-related building maintenance services, are funded primarily through the state and local taxes which comprise the school district's general budget.

2. Legislation, Regulation and Standards

The Department of Education is authorized by statute to provide "technical assistance, awareness training, and research and technical publications relating to life safety, casualty, sanitation, environmental, maintenance, and custodial issues; and, as needed, technical assistance for survey, planning, design, construction, operation, and

evaluation of educational and ancillary facilities and plants...." Fla. Stat. §235.014(9). This law also authorizes the agency to establish requirements, including safety and health requirements, for educational facilities.

The Department has issued "State Requirements for Educational Facilities" (SREF), covering matters including property acquisition / disposal, finance, lease, program development, professional services, inspection services, design standards and inspection standards. The requirements contained in SREF, also known as the State Uniform Building Code for Public Educational Facilities Construction, are incorporated by reference into agency regulations. F.A.C. §6A-2.0111. According to the rule's Preface, SREF was revised in 1997 to "meet the intent of the State for deregulation of construction of educational facilities, while keeping as the primary focus the safety of the students...." SREF applies to all educational and ancillary facilities constructed by a school board, and those facilities are exempt from other state or local building codes.

SREF addresses IAQ issues primarily through its ventilation requirements. For new buildings, all HVAC systems must be designed for air quality and quantity and installed in accordance with the 1994 Standard Mechanical Code (which incorporates ASHRAE standard 62-1989). SREF §5.3. For existing buildings, HVAC systems must be inspected to ensure that the system is "operating as designed or has been re-evaluated if space use changes have occurred or if unusual contaminants or unusually strong sources of specific contaminants were introduced into the space." SREF §5.5.

Also included in SREF is a requirement that local school boards adopt "pest management programs in accordance with EPA's Integrated Pest Management in Schools guidelines." According to Department of Education officials, parents' advocacy on this issue was largely responsible for the inclusion of this provision. In addition, the PTA in Florida has advocated for state legislation addressing pesticide application and other IAQ problems.

3. Activities

School districts and community colleges are responsible for addressing IAQ problems in individual schools. The state's role has been to facilitate prevention and

resolution of IAQ problems by providing training and technical assistance to local school personnel.

Training. The agency views training as a key function. The Bureau of School Facilities trains people on how to recognize and deal with IAQ problems. Upon request, the Office can provide a training session of approximately four hours on general IAQ issues or on microbial contaminants. This fall the office will deliver a workshop on how to provide for effective moisture removal in the design of schools.

The Bureau of School Facilities also provides school staff with written information. For example, the office publishes a newsletter on IAQ and other facilities management issues, which it distributes to all principals and facilities managers. Staff occasionally send memos to schools on specific IAQ issues. The office has sent every school district and community college a free IAQ Tools for Schools kit, which the agency received without charge from EPA. According to agency staff, some school personnel actively use the kits or have adapted the kits for use in their schools.

The Bureau of School Facilities tries to leverage free outside resources to assist schools. In addition to making available the IAQ Tools for Schools kits, the office has helped arrange for experts to conduct regional workshops throughout the state. The Department has also worked closely with the University of Florida and the Florida Solar Energy Center.

Direct Support and Technical Assistance. The Bureau of Educational Facilities sometimes conducts site visits to schools to provide technical assistance for correcting particular IAQ problems. Staff also assist schools in conducting inspections and performing preventive maintenance on air handling systems and other equipment. The Department of Labor and Employment Security assists with IAQ testing in schools.

Approval of New Construction Projects. According to agency officials, schools are no longer required to submit new building plans to the Department of Education for review. This change resulted in part from agency budget and staff cuts. Review by the Bureau of Educational Facilities is now optional, and is offered to help schools ensure that they achieve compliance with state requirements.

Integrated Pest Management Activities. During the last couple of years the Bureau of Educational Facilities has been actively working to implement the state's rule on integrated pest management (IPM). The office has sent memos to school personnel explaining the rule's requirements. This office's IPM activities are guided by an advisory committee that includes state agencies, the University of Florida, school districts, industry representatives and environmental groups. The office has conducted several state-wide IPM workshops for school personnel, and is planning four additional regional workshops for fall, 1997. The University of Florida, in cooperation with the Department of Education, has received a grant from EPA Region IV to create an internet home page as a resource on IPM and to develop model contract specifications for hiring pest control professionals.

According to agency officials, by mid-1996, approximately 15 percent of the state's school districts were using IPM. Officials predict that the Department's school survey on IPM this Fall will show about 80 percent of schools using IPM.

V. DEPARTMENT OF MANAGEMENT SERVICES

A. Background

The Florida Department of Management Services (DMS) is responsible for overseeing the construction and management of all state-owned and state-leased buildings. There are about 75 state buildings under the jurisdiction of DMS, totaling over 16 million square feet.

The Division of Facilities Management (DFM) is one of several divisions of the agency. Within DFM are three Bureaus: long range planning; property leasing and management; and property maintenance. Managerial functions relating to indoor air quality are carried out mainly by the Bureau of Maintenance.

In addition, the Division of Building Construction addresses indoor air quality issues relating to the design and construction of new state buildings.

B. Division of Facilities Management - Bureau of Maintenance

1. Background

Creation. DFM officials note that two or three years ago, with the support of agency management, DFM began taking a more proactive approach to IAQ issues. Around this time, the agency purchased state-of-the-art equipment for conducting IAQ testing. Most of the activities described below have been initiated within the past two to three years.

Jurisdiction. DFM is responsible for providing back-up support and assistance to the on-site building managers who are responsible for day-to-day building maintenance. In this way, DFM is responsible for a broad range of indoor air issues.

Personnel. Within the Engineering Section of the Bureau of Maintenance, four employees address IAQ, among other issues -- the Department's environmental health and safety coordinator, who has experience in industrial hygiene, toxicology and risk management; two environmental health specialists; and one administrative assistant. Elsewhere in the Bureau of Maintenance are three people who comprise the air handling maintenance team, as well as controls engineers who continually adjust air handling system controls for all state buildings.

Financial Resources. Indoor air quality activities are not funded through a single allocation within DMS. Aside from funding for personnel, there are two principal allocations for specific projects that relate to health and safety. One is dedicated to responding to emergencies, complaints or other requests for assistance. Another is for planned maintenance projects -- e.g., duct cleaning in a large building. There is no formal tracking of the amount of these funds used for indoor air quality-related work.

2. Legislation, Regulation and Standards

The Division of Facilities Management is responsible for implementing the Florida Building and Facilities Act, which includes establishing comprehensive maintenance and preventive maintenance programs for approximately six million gross square feet of state facilities. Fla. Stat. §255.501-525.

The only IAQ-related standards applicable to state-owned buildings are the occupational health standards which are enforced by the Department of Labor and Employment Security.

The Department of Management Services is the agency that was charged with implementing House Bill 251, the 1994 legislation addressing indoor air quality in public buildings. As described earlier, this measure called on the Department to present a report to the legislature with recommendations for improving IAQ in schools, state agencies and workplaces. DMS convened the Indoor Air Quality Committee that produced the final report in January, 1995.

3. Activities

Indoor Air Quality Monitoring. According to officials, all buildings under DMS jurisdiction are monitored at least every six months for common indoor contaminants -- for example, CO, CO_2 and H_2S. The Division of Facilities Management is keeping track of the data collected in order to be able to observe changes and correct problems at an early stage.

Preventive Maintenance. The Division of Facilities Management has adopted a preventive maintenance system for air conditioning and air handling systems. The agency set up a three-person team, whose only function is to clean the air handling systems in state buildings.

The agency also has begun implementing integrated pest management practices. Officials note that this change has led to a substantial reduction in pesticide-related complaints.

Other prevention-oriented steps noted by agency officials are the use of high velocity pleated filters, and the requirement that custodial supervisors ensure that housekeeping chemicals are diluted.

Renovation Practices. DFM has begun installing filter systems in building air handlers to remove volatile organic compounds and odors resulting from renovation work such as painting or the installation of new carpets and furniture. These systems

are installed prior to re-occupancy, and measurements are taken to ensure the system is functioning. The Division recently budgeted additional funding to expand the use of this practice.

Investigation and Repair. On-site building managers sometimes request assistance from DFM in handling individual IAQ problems. DFM staff may then make a site visit and conduct a building investigation.

Training. DFM has created a one-day course on IAQ issues for building managers, along with an annual refresher course. The office has delivered the course, through video tele-conferencing, to nine locations statewide.

C. Division of Building Construction

The design and construction of state buildings is the responsibility of the Division of Building Construction, which has architects, mechanical engineers and other building professionals on staff. The only design requirements directly relevant to indoor air issues are those contained in ASHRAE standard 62-1989, which are incorporated into the Standard Building and Mechanical Codes applicable to all state buildings. (See Section VIA). The Division uses a proto-typical building design, including a model HVAC scenario. According to agency officials, the Division of Building Construction considers indoor air quality to be important and seeks to ensure generally that IAQ issues are addressed during the design and construction process -- for example, through proper placement of moisture and water vapor barriers. One area in which the Division is not involved is the furnishing of the building interior, and thus the office does not purchase or install furniture, carpets or paints.

VI. OTHER STATE AGENCIES

A. Department of Community Affairs

The Florida Department of Community Affairs / Office of Building Codes and Standards addresses indoor air issues primarily through the adoption of building codes. There is no single mandatory building code at the state level in Florida. The state does require local government to adopt minimum codes. Specifically, state law requires that

local governments (as well as the state agency responsible for state buildings) adopt and enforce one of three model building codes approved by the state.[13] Fla. Stat., Chap. 553. These model codes are the Standard Building Code, the South Florida Building Code and the EPCOT Code.

According to agency officials, most local jurisdictions have adopted the Standard Building Code. A central function of the Department of Community Affairs is to identify and update the editions of these model codes that may be adopted by local governments. The agency recently adopted a regulation incorporating the 1997 version of the Standard Building Code. F.A.C., Chap. 9B-3.047. According to agency officials, there is a delay in local adoption of updated codes, and most jurisdictions in Florida now incorporate the 1994 edition of the Standard Building Code, which references ASHRAE standard 62-1989. Local governments may exceed the minimum standards contained in the model code.

The Department has also been involved in indoor air issues through the adoption of radon-resistant construction standards. The state legislature enacted a law in 1988 requiring the agency to develop and adopt standards for building codes for radon-resistant buildings, as well as construction standards for mitigation of radon in existing buildings. Fla. Stat. §553.98. According to state officials, the development of new construction standards generated substantial opposition from the building and real estate industry. In 1996, the Department adopted by regulation a standard for radon-resistant construction for voluntary adoption by county governments. F.A.C., Chap. 9B-52, New Commercial Building Construction. According to agency officials, no county has adopted the standard so far, although builders in the state are using the standard in practice. In 1994, the Department published voluntary guidelines for mitigating radon in existing buildings.

B. Department of Environmental Protection

The Florida Department of Environmental Protection addresses indoor air pollution in a limited fashion. The agency's Division of Air Resources Management responds to telephone calls from the public by providing information or by making referrals to other state agencies. The agency participates in interagency work on indoor air quality issues, including the Indoor Air Quality Committee meetings and the

quarterly conference calls coordinated by EPA Region IV. These tasks are carried out by one employee within the office, and are funded through an EPA grant under Section 105 of the Clean Air Act.

The Florida Department of Environmental Protection received a grant from the federal government to undertake a comparative risk assessment to determine which environmental problems pose the greatest risks to Florida. The project, which was carried out by the Florida Center for Public Management involved three phases: a technical assessment phase, in which problems were evaluated and ranked; a public review phase, in which technical experts and lay persons reviewed the research and developed an integrated ranking; and a strategy development phase, to develop options for reducing risks. The project culminated in a report titled *Comparing Florida's Environmental Risks*, published in September, 1995. The report provided three sets of risks rankings -- human health, ecological and quality of life -- as well as an integrated risk ranking.

The project ranked indoor air quality problems as the top risk to human health -- the only environmental problem to be placed in the highest risk category. IAQ was ranked as a "serious" risk overall (below the four "critical" risks -- loss of ecosystems, patterns of development, water quality and water quantity). The report noted that indoor air problems may affect Floridians to a greater extent than others in the U.S., due in part to the fact that Floridians spend more time indoors and that Florida is home to a large, sensitive elderly population. Indoor air quality issues affecting Floridians are described in detail in a technical appendix to the report.

C. Department of Agriculture

The Department of Agriculture's responsibility over indoor air quality issues is related chiefly to its regulation of pesticide applicators. If the Department receives a complaint about a pesticide application indoors, the agency's Bureau of Entomology and Pest Control has jurisdiction only over whether the pesticide was applied according to its label directions. According to agency officials, if a complaint involves any health-related issues, the matter is referred to the Department of Health.

The state has no laws limiting the application of pesticides indoors, other than requiring application in accordance with pesticide labeling. The Department of Agriculture has developed a registry of people who wish to have notice of pesticide applications that may affect them, called the Chemically Sensitive Person List. Certified pesticide applicators are required to give notice of pesticide applications to persons on the list before spraying at or near their homes.

D. Department of Business and Professional Regulation

The Department of Business and Professional Regulation (DBPR) has two principal components -- Professional Regulation and Business Regulation. Professional Regulation issues licenses for about thirty professions whose members are required by state law to take a certification examination. With respect to a number of these professions, the office inspects places of business regularly -- for example, cosmetology salons, funeral homes, and veterinary offices. These inspections consist of a general walk-through; if agency officials detect an indoor air problem during these inspections, they may be able to require the facility to correct the problem. The rules governing the operation of these licensed professional facilities may include standards that relate generally to indoor air quality. For example, the rules governing cosmetology salons contain a provision requiring that each salon be kept well ventilated.[14] Indeed, officials note that the agency's principal contact with indoor air quality problems is through these salons, which use chemicals that sometimes affect patrons and neighboring commercial establishments. For serious indoor air problems, the agency will contact other state offices for assistance.

The other component of DBPR, Business Regulation, licenses mainly hotels, restaurants and condominiums. According to officials, the only IAQ issue dealt with by this office is environmental tobacco smoke. The office is responsible for implementing the state's smoking law in restaurants and hotels.

VI. LOCAL GOVERNMENT ACTIVITY

A. IAQ and Local Health Departments

County health departments are funded in large measure by the state and their staff are considered state employees. The Florida Department of Health provides matching grants to a number of county health departments for IAQ work. Two

counties that have been active in this area for some time are Palm Beach County and Polk County.

Palm Beach County Health Department. Palm Beach County, located north of the Miami and Fort Lauderdale metropolitan areas, has been addressing indoor air quality issues for close to ten years. An important factor in this long-standing activity, according to local health department officials, is a commitment on the part of county commissioners to fund IAQ-related activities (along with numerous other health-related services). When fully staffed, the agency has 2.5 full-time equivalent positions that respond to commercial and residential IAQ problems. Palm Beach Health Department's chief IAQ activities are providing education and information and undertaking field investigations to facilitate resolution of specific IAQ problems. The office also sometimes lends its equipment to the public.

The principal criterion for pursuing a case is the report of a health problem that appears consistent with exposure to an indoor air pollutant. Agency officials estimate that the office receives about 400 requests for assistance each year, and performs 200 actual field visits. Of these visits, roughly 60 per cent are to residential properties and the rest are divided among commercial buildings and county facilities. Officials note that the agency continues to address IAQ in private workplaces, but rarely handles cases involving state buildings. The agency also has relatively little involvement with schools. The agency makes site visits only with permission of the owner or occupant. Although the agency lacks authority to require building owners to take action, the agency adopts a "common sense" approach and notes that they are generally successful in facilitating resolution of indoor air problems. The program functions more or less independently of the state IAQ program.

Polk County Health Department. Polk County, located between Tampa and Orlando, began its IAQ work in the early-mid 1980's, in response to public concern about mobile homes and formaldehyde. Radon has also been a prominent issue, as Polk County has among the highest radon potential of any county in the state. Until recently, the county tried to address this and other IAQ issues without funding, and activities were therefore mainly reactive in nature. The county commissioners approved the imposition of a fee for county IAQ services, though this proved somewhat inconsistent with the health department's goal of encouraging building owners to voluntarily address IAQ problems. State grant funding has enabled the county to respond to a greater number of requests from the public (primarily in residential and

county buildings) and conduct more field investigations. In addition to providing technical assistance and public education, the agency has proficient radon measurement and lab analysis capability, and has tested all of the county's schools for radon. The county program sometimes seeks state advice or equipment in specific cases.

B. Green Building Initiative in South Florida

In south Florida, local government agencies are working together to implement a green building initiative aimed at achieving sustainable buildings and neighborhood development. The Dade Green Coalition, whose meetings are open to the public, was formed under the auspices of Metropolitan Dade County government and is composed of 22 stakeholders: local government agencies, professional associations, trade associations, corporations, individuals and academic institutions. One local official estimated that the governmental agencies in the Coalition control a total of approximately 80 million square feet of building space and about $1 billion per year in new construction. The Coalition came together for the primary purpose of developing a conference to address all aspects of building operation, development and siting. That conference, the First South Florida Sustainable Building Conference and Exhibition, was held in April, 1997, and resulted in the development of a draft "action agenda" for putting in practice the ideas generated at the meeting.

The Coalition is continuing its work to finalize and implement this action agenda. One project already underway is the creation of a "green neighborhood." The 1997 conference was funded through private and governmental grants. The Coalition will apply for additional grants to fund its future work. The Coalition's focus on urban planning and design issues reflects the unique land use issues of southern Florida. Indoor air issues are integrated to an extent into the Coalition's building design efforts; for example, one item on the action agenda is to require all new buildings to incorporate Total Building Commissioning.

VII. OBSERVATIONS

Florida's warm, humid climate and considerable population growth are important contributors to the concern for indoor environmental issues and to the IAQ problems found in the state. Although the state has addressed certain aspects of indoor

air quality for a long time, IAQ issues have gained attention in a number of Florida agencies and the state legislature over the past few years. While various initiatives have evaluated risks from indoor air pollution, reviewed agency programs and issued proposals for coordinating the state's various indoor air activities, IAQ programs in Florida remain agency-specific and independent of one another. An informal network of state IAQ officials serves to keep agency officials aware of other activities and to facilitate coordination in addressing specific problems.

In 1995, a state-funded risk analysis report ranked indoor air quality highest among environmental threats to public health. Also in 1995, the interagency committee presented its report proposing a vision of the state's future work in this area. These reports have underscored governmental and public concern about indoor air quality, and they have provided some agencies with impetus for increased attention to IAQ problems within their jurisdiction. It is uncertain, however, whether the future will see broader efforts to address IAQ policies across agencies and program areas in Florida.

A. Structure and Focus of State IAQ Programs

Jurisdiction

Indoor air responsibilities are distributed among numerous Florida agencies, based both on building type / use and specific contaminants.

The Department of Health's Radon and Indoor Air Office is the state's principal program, and is responsible for addressing general indoor air quality issues in non-workplace settings (including complaints from affected third parties that involve a workplace, such as a student in a public school). The Department of Labor and Employment Security is responsible for indoor air issues in the workplace. Both of these agencies provide support to other agencies with responsibilities over particular buildings -- e.g., the Department of Education (local school districts) and the Department of Management Services (state buildings).

Overlaying this division of jurisdiction are the authorities of various offices to address specific indoor pollutants. For example, radon is addressed primarily by the Radon and Indoor Air Office, regardless of building type. Environmental tobacco

smoke is addressed by the Departments of Health and Business and Professional Regulation, through enforcement of the state smoking law. Pesticide application is addressed by both the Department of Health and the Department of Agriculture. Lead is addressed primarily by a separate office within the Department of Health's Bureau of Environmental Toxicology.

Interagency Coordination

State agencies often work together to address IAQ problems or to share education and training resources. The Department of Labor and Employment Security works with the Departments of Education and Management Services when investigating problems in schools and state buildings. The Department of Health works with the Department of Education, as well as with the Department of Agriculture and the Department of Business and Professional Regulation.

The 1995 report produced by the Indoor Air Quality Committee states that the "committee believes that IAQ can most economically be addressed by centralizing the functions of standards establishment, education and training, and information and statistics research."[15] The Committee felt that the creation of an interagency body on indoor air quality would help eliminate duplication, increase coordination and allow local governments to focus resources on handling their IAQ problems.

No action has been taken by the legislature or by the executive branch to create a formal interagency body on IAQ issues. Nevertheless, the process of generating the legislative report, which involved representatives of about eight state agencies, seems itself to have enhanced inter-agency coordination. The preparation of the report provided an opportunity to share information and become familiar with other offices. Moreover, a number of agency officials on the Committee continue to meet on an informal basis.

Activities

State indoor air quality programs in Florida work to promote good IAQ practices in privately owned buildings and local government facilities, as well as to prevent and address IAQ problems in state buildings. State agencies have regulatory authority in

the areas of environmental tobacco smoke, radon and general occupational health and safety in public buildings.

A prominent feature of Florida's indoor air programs is an emphasis on training and education to enable building owners and managers to solve their problems with common sense and technical knowledge. Two agencies, the Department of Health (Radon and Indoor Air Office) and the Department of Labor and Employment Security, also incorporate site investigation and technical assistance as an important part of their programs. The Department of Education engages in these activities as well, though to a lesser extent due to funding constraints.

Also notable are the efforts of Florida's state buildings agency, which has sought to address IAQ issues proactively through its construction and maintenance activities.

State-Local Relationships

Florida's agencies often have central offices located in the state capital and regional or local offices around the state. With respect to IAQ issues, this has resulted in the central office serving to coordinate policy, coordinate and support the local offices, and undertake research and education. The local offices work more directly with the public and with individual IAQ problems, while the central office provides back up in certain types of cases.

Perhaps the most notable feature of Florida's central IAQ program within the Department of Health is its decentralized character. This decentralization is achieved through a state matching grants program, which funds the work of county health departments who receive funding from the state and whose staff are considered state employees. As a result of this grants program, a greater number of local health department offices can respond to public requests for assistance in addressing IAQ problems. The central state agency functions as a resource of last resort in specific cases. According to state officials, this increases the number of people who can receive assistance, as well as reduces the lead time in responding to public inquiries. This scheme is not applicable to the area of radon, which remains concentrated in the central state Department of Health office.

The Health Department also relies on county health departments to conduct inspections necessary for investigating complaints under the smoking law. The Department of Labor and Employment Services has several regional offices that respond to complaints or inquiries, with the central office providing back-up support and assistance.

B. Factors Influencing the Development and Implementation of Florida Programs

Florida's Indoor Air Problems

The increase in activity in Florida's indoor air programs is attributable in large measure to highly publicized and costly IAQ problems affecting county courthouses and public schools in the early 1990's. These problems involved lawsuits against private and governmental parties, required local governments and school districts to spend millions of dollars, and generated widespread publicity.

Although there have been a number of very high-profile cases, the problems in those buildings reflect indoor air problems that are typical in Florida. The state's humid conditions make it difficult for ventilation systems to remove sufficient moisture from a building. The highly publicized incidents of the early 1990's seem to have provided an impetus for state attention to potential IAQ problems throughout the state.

Legislation, Regulations and Policies

Legislation has played a significant role in the development and implementation of state IAQ programs. Three laws stand out as particularly important in establishing agency priorities and activities. First, the state radon law, enacted in 1988, set forth a number of radon program activities as well as required radon testing in schools and certification of radon professionals. Florida's radon program, which includes a large staff and operates throughout the state, has been guided by the authority and mandates contained in the law. Second, the state's smoking law restricts smoking in public buildings and has established an enforcement scheme that is carried out by the Health Department. Finally, HB 251 required the Department of Management Services to make recommendations to the state on addressing indoor air quality in public buildings. This measure resulted in the creation of an interagency Indoor Air Quality

Committee that reviewed the state's role in this field and issued recommendations for future coordinated state activities. Although the legislature has not acted on the Committee's recommendations, the review process was an opportunity for a broad spectrum of state agencies to learn from each other and to consider the future of IAQ program activities.

Based on the Florida legislature's 1997 report reviewing the state's IAQ programs, it appears unlikely that new indoor air legislation will be enacted soon. The report suggests that new directions in Florida's programs will not be motivated by legislation. According to agency officials, it is also unlikely in the current political climate that new regulations or standards governing indoor air quality will be adopted soon.

There is no single approach to addressing indoor air quality across state agencies, either in terms of common IAQ assessment protocols or common standards for contaminants, ventilation or maintenance practices. Other than the general OSHA workplace standards adopted by Florida for public workplaces, there are no state IAQ standards for contaminants applicable to existing buildings for the subjects addressed in this report. The Department of Labor and Employment Security proposed, but did not adopt, standards for all non-industrial workplaces. The Department has developed a set of standards that it uses as guidelines when investigating IAQ problems. With respect to operations and maintenance practices, the Department of Education requires schools to operate their HVAC systems according to design standards and also requires schools to implement integrated pest management programs. Agencies generally use "best management practices" and accepted industry standards as guidelines when working with building managers or providing advice and assistance to the public on IAQ problems.

With respect to new construction, Florida does not have a single state-wide mandatory building code. However, the state requires local jurisdictions as well as state agencies with construction authority to adopt one of three minimum building codes designated by the state. Most local jurisdictions, as well as state agencies, have adopted the Standard Building Code, which incorporates ASHRAE standard 62-1989. Department of Education regulations require that all new school HVAC systems be designed for air quality and quantity and installed in accordance with the 1994

Standard Mechanical Code (which incorporates ASHRAE standard 62-1989).

The state's radon-resistant construction standard is a model/voluntary standard, which has not yet been adopted by local jurisdictions.

State-Federal Relationships

The federal government has played a significant role in facilitating and supporting indoor air programs in Florida. Agency officials cite federal training and education efforts as particularly important. Materials developed by EPA are used regularly by various agencies. EPA's first IAQ Tools for Schools classes were in Florida, and the state is the site of two federal pilot studies on IAQ issues.

Federal funding of indoor air programs has been important to the state as well. Most notably, the Department of Health receives radon grants from EPA, and the Department of Labor and Employment Services receives federal (OSHA) funding to carry out its investigation and consultation work, which includes attention to IAQ issues. In addition, EPA is funding two innovative integrated pest management projects through the University of Florida, in coordination with the Department of Education. The Department of Health's environmental tobacco smoke work began with funding from the federal Department of Health and Human Services. Finally, the Department of Environmental Protection's limited role in IAQ issues is supported by Clean Air Act funding provided by EPA.

Stakeholder Participation

Stakeholder involvement in indoor air quality issues has helped shape Florida's policies and programs, although that involvement has mainly been accomplished outside formal governmental (administrative) processes. Interested parents helped elevate the issue of IAQ in schools, which in turn led to broader awareness of indoor air problems generally and to the adoption of integrated pest management policies at the Department of Education. Non-governmental health organizations have worked closely with the state to promote and implement stronger restrictions on smoking in public buildings. In addition, builders, building owners/managers and real estate

professionals have been fairly active and vocal about radon and indoor air policies in Florida at the state and local level. In particular, these stakeholders have voiced strong opposition to proposed indoor air quality occupational standards and to proposed mandatory radon-resistant new construction standards. State officials also come into frequent contact with the large IAQ service industry -- through work on specific IAQ problems as well as through regulating their practice in the case of radon professionals. In addition to these interactions, the Department of Labor and Employment Services has created "customer councils," a formal mechanism for increasing stakeholder involvement in the Division of Safety's activities.

Resources

State funds are targeted for indoor air quality work in only a few areas. The Department of Health receives funding for radon work and for general indoor air quality work, as well as funding to support enforcement of the state's smoking law. In these cases, such targeted funding has translated into trained staff who can focus on IAQ problems, and has been key to the active role of state and local agencies. The agency has been seeking increased IAQ funding to enable its program to reach local jurisdictions in all parts of the state. In the area of radon, a legislatively imposed building surcharge funded the program for a number of years; radon certification fees continue to supplement general state funding for the program.

In other agencies, staff address indoor air quality in addition to other health and safety issues, and IAQ-specific projects compete with other priorities for general agency funds. In a number of state agencies, concern over IAQ issues in the 1990's prompted the purchase of more advanced equipment for conducting IAQ investigations.

Limited funding has been a particularly significant factor with respect to indoor air quality in schools. Indoor air issues are often not a priority issue for local schools districts compared to other maintenance issues, and educational programs tend to win out over maintenance in competition for limited funding. At the state level, the Department of Education experienced substantial budget cuts over the past few years, at the same time that public concern and inquiries over indoor air in schools have increased. This has led to the elimination or postponement of certain IAQ-related

projects. The Department has only one staff person who spends part of his time addressing IAQ issues directly.

ENDNOTES

1. Florida Center for Public Management, *Comparing Florida's Environmental Risks* (Technical Appendix), 68 (September, 1995).

2. *Id.*, at 75 (citing 1991 EPA study).

3. Florida Department of Management Services, *Indoor Air Quality Report*, 22 (January, 1995).

4. *Id*., at 12.

5. Office of Program Policy Analysis and Government Accountability, *Review of Florida's Indoor Air Quality Programs*, at 2,4 (1997).

6. *Id*, at 3.

7. This umbrella group consists of Florida chapters of the American Heart Association, the American Cancer Society and the American Lung Association.

8. According to the Department of Health, as far back as the mid-1990's, RIA received an average of five calls a week from schools statewide complaining about poor indoor air quality. Teresa D. Brown, "Sick schools," *St. Petersburg Times*, 1D (September 20, 1993).

9. State regulations provide that the Department of Health is to request an inspection if the alleged violator fails to respond to the agency's letter or if the complaint persists. Fla. Admin. Code §10D-105.010(2).

10. Officials note that there is a lag time in incorporating federal regulations, and the state is now working on 1993 federal standards.

11. The benchmarks include:
- humidity - 60% time weighted average or 65% instantaneous reading;
- CO - outdoor reading plus 2 ppm weighted average or $\leq$ 5 ppm instantaneous;
- VOCs - $\leq$ 3 ppm instantaneous reading; and
- CO_2 - 1000 ppm weighted average or $\leq$ 1400 ppm instantaneous.

12. "Toxicologist: Evidence of Sick School Syndrome Growing," *Sun-Sentinel* (Fort Lauderdale), 5A (July 13, 1993). According to another newspaper account from 1993, all of Broward County's 190 schools had been the subject of complaints about poor indoor air quality. John Gittelsohn, "Complaints of Bad Air Hit Every County School," *Sun-Sentinel* (Fort

Lauderdale), 1B (Feb. 15, 1993).

13. The Florida Building Code Study Commission, established by an Executive Order, is studying whether the current system should be revised to establish a single mandatory state-wide building code which would be enforced at the local level. The Commission is expected to issue recommendations in December, 1997.

14. Florida Administrative Code (Department of Business and Professional Regulation) §61G5-20.002(c)(1).

15. Florida Department of Management Services, *Indoor Air Quality Report*, 23 (January, 1995).

Chapter Five

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Minnesota

I. INTRODUCTION

A. Political and Demographic Features

The majority of Minnesota's 4,375,099 residents are concentrated in the metropolitan area surrounding the state's capital, St. Paul, and its largest city, Minneapolis. Approximately 2.5 million people live in this area, while the remaining residents are distributed across Minnesota's 87 counties, which cover 86,943 square miles of land and lakes.

B. Geographic Features and Indoor Air Quality Issues

The indoor air quality issues of greatest concern to government agencies and the public in Minnesota are directly related to the cold climate and the accompanying need for energy efficient construction and extensive exposures to indoor air. In addition to radon and lead, considerable attention has been paid to environmental tobacco smoke, biological contaminants (for example, mold caused by uncontrolled moisture and tight houses), and combustion pollutants in residential buildings (for example, carbon monoxide produced by appliances in energy-tight houses).

As a cold climate state, Minnesota conditions are more extreme than "national design conditions." For example, national design conditions for cold temperatures are -11° F. Winter temperatures in Minnesota range to -38° F, and one town in Minnesota reached -60° F two years ago. Thus, national standards may be inapplicable.

C. Political and Legislative Highlights

Public awareness of IAQ issues is one factor in the state's implementation of indoor air programs. Because of the climate, Minnesotans spend a great deal of time indoors. As a result, people in the state may be more likely to connect their ill health to

indoor environmental conditions.

In 1975, Minnesota became the first state to pass a comprehensive anti-smoking law that regulated smoking in all public places. It also has been a leader in regulating the use of combustion engines indoors. This is especially the case with respect to enclosed sports arenas such as ice rinks, due in part to concern over health effects related to carbon monoxide and nitrogen dioxide gases released by ice resurfacers.

The state's building and energy codes address IAQ issues directly by specifying appropriate ventilation rates. The energy code is being updated to mandate mechanical ventilation systems in residential construction and to provide additional details regarding how the appropriate ventilation rates can be achieved. Minnesota is one of the first states to broach this subject.

The recently concluded special legislative session resulted in extensive new requirements to address IAQ issues in schools. The legislation requires consideration of IAQ issues at the state and local levels and directs the state's Department of Education to develop and distribute technical information about indoor air quality to school districts, parents and medical professionals.

D. Overview of Governmental Structure for Addressing IAQ Issues

Primary responsibility for indoor air quality issues in Minnesota rests with the Department of Health, which has addressed a variety of IAQ issues over the past twenty years, and which created an office to coordinate the agency's approach to these issues. Indoor air quality in the schools, a growing responsibility in the state, is addressed by the Department of Children, Families and Learning.

Other state agencies are responsible for specific contaminants, buildings or activities relating to indoor air quality. The Department of Agriculture regulates the indoor application of pesticides. The Department of Labor and Industry is responsible for indoor air quality issues in the workplace. The Department of Employee Relations is responsible for responding to IAQ complaints in state-owned and leased buildings. In addition, two agencies -- the Department of Administration and Department of

Public Service -- develop the state building and energy codes, which incorporate ventilation standards.

The Department of Health is a focal point for most IAQ-related activities in the state. There is no formal coordinating body for the various state agencies that have some jurisdiction over the subject.

II. MINNESOTA DEPARTMENT OF HEALTH

A. Introduction

Within the state Department of Health, the Division of Environmental Health implements the central IAQ program in the state, through its Indoor Air and Lead Unit. This program is described at length below. In addition, the Division of Disease Prevention and Control conducts investigations and fact-finding in certain situations that may involve IAQ issues. For example, acute epidemiology staff investigate reports of airborne transmission of disease, such as Legionnaire's Disease. Finally, the Asbestos Unit in the Environmental Health Hazard Management Section of the Division of Environmental Health, is responsible for addressing asbestos in commercial buildings.

B. Indoor Air and Lead Unit

In Minnesota, most IAQ issues fall within the jurisdiction of the Indoor Air and Lead Unit (IALU). In addition to exercising regulatory authority over environmental tobacco smoke, lead and indoor pollution in enclosed sports arenas, the Unit coordinates and promotes local IAQ efforts and educates the public.

1. Background

Origin. The Indoor Air and Lead Unit was formed in July 1989 by joining several positions that already existed within the Department of Health. Prior to that time IAQ issues were being addressed separately by people who worked on issues such as environmental tobacco smoke and indoor pollution in enclosed arenas. Five of these staff members helped form the IALU when additional funding became available in 1989. In 1989, the Unit dealt with many of the issues currently addressed, although

over time the focus has changed as new concerns have arisen and more resources have become available.

Jurisdiction. The Indoor Air and Lead Unit exercises regulatory and enforcement authority over smoking, enclosed arenas, and lead. The Unit also carries out activities relating to radon and general IAQ issues. The IALU does not address asbestos, which is covered by a different office in the Department of Health.

The activities of the Indoor Air and Lead Unit's are not limited to particular types of buildings or building uses, or to particular geographic regions.

Personnel. The Indoor Air and Lead Unit supports 22 full time equivalent positions (FTEs): one supervisor, five administrative support staff and two teams of technical staff. These two teams are roughly equally divided between regulatory inspection / enforcement and education / research activities. The education / research team includes five health educators and two people who conduct literature research on IAQ subjects.

Financial Resources. The IALU budget for last fiscal year was approximately $2 million. Approximately one-quarter of this was passed through to local jurisdictions. The sources of the Unit's budget were state general funds and federal grants (primarily from EPA and HUD for radon and lead activities). Minnesota is unusual in having used some of its EPA radon grant funding for activities incorporating other IAQ issues (with EPA approval).

State general funding has decreased somewhat since the creation of a formal indoor air quality program in 1989. The Unit has lost about 1 FTE and some general supply and expense monies. The legislature expects regulatory programs to be self-supporting through fees, although this has proven difficult in the area of indoor air quality. The Unit has considered charging fees in connection with enclosed arenas, but since there are so few, this has not been lucrative. The Unit has become more aggressive in pursuing federal grants, and over 50 percent of the Unit's funding now comes from federal grants. The office has been receiving radon grants for eight years, other grants for three years or less.

2. Legislation, Regulations and Standards

The IALU is responsible for implementing laws relating to indoor air quality in three principal areas -- smoking, enclosed arenas and lead.

The Clean Indoor Air Act was enacted in 1975 to "prohibit[] smoking in areas where children or ill or injured persons are present" and to "limit smoking in public places and at public meetings to designated smoking areas." Minnesota Statutes §§144.412-.417, 144.4165. Under the law, smoking is prohibited in day care centers, group family day care homes, health care facilities and clinics, and any facilities and vehicles used or owned by school districts. Smoking is prohibited in all other "public places," except in designated smoking areas.

The regulations implementing the Clean Indoor Air Act outline size and proximity requirements for acceptable smoking and non-smoking areas in public places, and specify the types of signs and notices required. Minnesota Rules §§4620.0050-4620.1450. Specific rules are provided for certain categories of affected places:

- Lunchrooms or lounges;
- Office buildings;
- Factories, warehouses or similar places of work;
- Restaurants;
- Bars;
- Public conveyances;
- Health care facilities;
- Hotels, motels and resorts;
- Common areas; and
- Retail stores.

In 1995, the Minnesota legislature confirmed the Department of Health's authority to adopt rules "relating to indoor air quality in the operation and maintenance of enclosed sports arenas." Minn. Stat. §144.1222, 240A.09.[1] In the same year, the legislature's annual appropriation for the Amateur Sports Commission authorized expenditures for rehabilitation and renovation grants, with priority to be given to

"indoor air quality improvements, including zero emission ice resurfacing equipment." Minn. Stat. §240A.09(I).

Regulations covering ice arenas and enclosed sports arenas have been in effect since July 1, 1973. Minn. Rules §§4620.3900-4620.4900. Under the regulations, the Department of Health issues operating certificates to ice arenas in which a resurfacing machine is used and to enclosed sports arenas in which internal combustion engine-powered equipment or vehicles are used (for racing, competition, demonstration or other purposes). The application for certification must demonstrate that "acceptable air quality conditions can be maintained." The regulations also specify:

- Acceptable IAQ conditions[2];
- Acceptable methods of maintaining such conditions; and
- Frequency and methods for measuring indoor air quality.

Enforcement methods outlined in the regulations include corrective action, and revocation or suspension of certification.

The Indoor Air and Lead Unit's enforcement activities are undertaken pursuant to the Health Enforcement Consolidation Act, which provides consistent enforcement standards and methods across all Division of Environmental Health regulatory programs. Minn. Stat. §144.993. Enforcement options include civil penalties (up to $10,000), attorney's fees for willful violations, and stipulation agreements.

The Unit can issue variances to its regulations. Minn. Rules §§4717.7000-.7050. Variances are usually given for site-specific activities and must include actions and language that will protect the public to the same extent as the original rule. The prohibition on smoking in K-12 schools cannot be varied. The following are examples of variances that have been granted:

- Industrial workplaces with heavier concentrations of smokers can allow smoking in areas beyond a designated lunch room or lounge during specific times (e.g., breaks).
- Convenience stores that have only one person on duty at night can allow smoking in the retail part of the store, provided they limit the location and the employee puts the cigarette out as soon as a customer walks in.

3. Activities

In March, 1995, the Department of Health set "achievable" "Year 2000" goals for radon, lead and environmental tobacco, and submitted those goals to the federal Centers for Disease Control (CDC). Radon goals include increasing the percentage of homes that have been tested for radon gas from 5 to 25 percent, and increasing the percentage of at-risk school rooms (rooms with ground contact or with a crawlspace underneath) and licensed day care facilities that have been tested for radon gas to 95 percent. The office has set a goal of reducing exposure to environmental tobacco smoke by increasing to 100 percent the number of public buildings, to 80 percent the number of worksites, and to 50 percent the number of restaurants that are smoke-free.

The Indoor Air and Lead Unit's 1997 workplan describes its activities as follows:

- Enforcing the lead statute and rules;
- Conducting inspections related to elevated blood lead levels;
- Providing lead-related health education;
- Collecting blood lead and environmental lead data;
- Accrediting lead abatement contractors, workers, inspectors, and training courses;
- Enforcing the Minnesota Clean Air Act and rules;
- Enforcing the enclosed sports arena rules;
- Responding to inquiries and complaints about indoor air quality, including radon; and
- Providing assistance on indoor air and lead to local health departments.

The Unit has developed internal workplans that include specific implementation steps for the main work areas in the office: lead, smoking, enclosed sports arenas, radon and general indoor air activities. The latter category included four objectives for the last fiscal year:

- Assist general public and building professionals in assessing the potential for indoor air quality problems in Minnesota buildings;
- Develop and maintain written information on indoor air issues;
- Develop carbon monoxide outreach campaign; and
- Educate administrators and maintenance staff about indoor air issues in schools.

In addition, the Indoor Air and Lead Unit is in the process of hiring a consultant to assist the Unit in developing its first three to five-year strategic plan.

Enforcement. Enforcement of the Minnesota Clean Indoor Air Act consists of updating the complaint procedure and form, surveying local health agencies every other year to determine which aspects of the law they enforce, preparing 10-day letters and administrative penalty orders as needed, and providing support for the state's lawsuit against tobacco companies.

Agency efforts to ensure compliance with enclosed sports arena rules have included inspection of all arenas once per skating season, drafting of a standardized protocol for arena inspections, training all field staff on the inspection protocol, and preparing 10-day letters and administrative penalty orders as needed. The state also requires the submission of air testing logs on a quarterly basis, and notification of air quality violations within five working days.

Education and Information. Education is an important focus of the Indoor Air and Lead Unit, which employs five staff members who specialize in health education.

The Unit does limited research on IAQ issues (including radon) and develops technical information brochures for dissemination to the general public. A draft revised list of the technical information brochures available includes the following topics:

- Air cleaners
- Asthma / allergies
- Biological / molds
- Carbon monoxide
- Carpet
- Combustion air
- Formaldehyde
- Humidifiers
- Indoor air quality (general and school)
- Environmental illness
- Office buildings
- Ozone
- Smoking - environmental tobacco smoke
- Smoking - Minnesota Clean Indoor Air Act
- Wood

The office has also produced numerous radon brochures on topics including: general information; maps; measurement; mitigation; new construction; real estate; and schools. Several radon brochures are available in languages other than English (Spanish, Cambodian, Hmong, Laotian).

The Unit also develops public education programs on specific IAQ issues, such as seminars for school administrators and teachers based on EPA's IAQ Tools for Schools materials. A carbon monoxide outreach campaign developed a public service announcement that was placed on shopping bags.

The Unit often uses workshops and focus groups to help design a new public information / education campaign. Before developing the IAQ Tools for Schools seminars, the Unit gathered a small group of advisors (including a representative of the nine county service cooperatives, the University of Minnesota Training Center, and school district representatives) to find out what information was important to the schools. Before launching its carbon monoxide campaign, the Unit used focus groups to review public service announcements. The Unit often sends materials out for review or surveys the public to identify effective means of communicating its IAQ message.

The IALU does not generally respond to individual IAQ complaints or requests for technical assistance for residences or private businesses. Individual IAQ problems generally are dealt with by private IAQ service companies. If IALU receives a number of complaints or requests for assistance on a single IAQ issue or problem, the Unit might be in a position to respond through targeted education or training. The Unit keeps tallies of the types of phone calls it receives from the general public, and often develops a fact sheet or technical information brochure if a "trend" develops. State officials note that some local jurisdictions do respond to incident-specific IAQ complaints.

Support to Local Governments. The Department of Health has worked to develop close relationships with local governments over a long period of time. IALU supports local governments through education and training, including its IAQ Tools for Schools workshops for school officials.

IALU redistributes to local jurisdictions grant monies the Unit receives from the federal government. The Unit also passes through state funding to local governments. Local governments are expected to use pass-through funding to educate their population about IAQ issues and test homes and buildings for radon. Local offices also use this funding to attend state-run training programs on IAQ issues. While most counties have focused on radon, Hennepin County has begun to look at broader IAQ issues, and has hired an IAQ specialist. Each of Minnesota's 37 counties has an extension agent, a county employee whose funding comes from a combination of county, state and land grant university money. IALU relies on the extension agents to provide IAQ information to the general public at the local level.

For many years, the Unit has been encouraging "cooperative partners" to build coalitions to disseminate relevant IAQ information and plan statewide IAQ activities. For the past three years, the Unit has provided funding (through radon grants) for the Minnesota Indoor Air Coordinators, a coalition made up of local public health officials, such as nurses, general environmentalists, health educators, sanitarians, etc. The coalition currently has 31 members, including 21 counties, six cities, and four others (the Department of Health, the University of Minnesota, the American Lung Association and Minnesota PIRG). The group meets every other month.

The coalition's mission is to "protect and preserve public health through coalitions which provide technical support and education on radon and other indoor air pollutants of concern to Minnesota residents." The long-term goal is to develop six regional clusters that will meet throughout the state and focus on local issues of concern.

An Indoor Air and Lead Unit staff person serves as the group's chair and liaison, and is responsible for assisting the local governments in developing sustainable programs and connecting them with existing resources. To date, most of the members' (and thus the coalition's) focus has been on radon. In February 1997, the group sponsored radon-resistant new construction workshops, and it plans to present other substantive programs in the future.

III. DEPARTMENT OF CHILDREN, FAMILIES AND LEARNING

A. Background

The Minnesota Department of Children, Families and Learning (DCFL) was created in 1995. It is responsible for administering a broad range of social services as well as educational programs for children. The intent of the legislature in creating the agency was to improve the well-being of children by coordinating programs and services. The Department's programs have been phased in since 1995, beginning with programs that were moved from the Department of Education.

Minnesota's 357 school districts are politically independent entities, with equal sovereign status to local governments. DCFL provides leadership and policy direction in many areas, including health and safety.

B. Capital Expenditure: Health and Safety Revenue Program

1. Background

Origin. In Minnesota there has been a tremendous increase in interest and knowledge about IAQ in schools, particularly following the 1994 General Accounting Office report on the subject and the American Lung Association's publicizing of that information in 1996. According to state officials, public awareness and concern have been key factors in addressing IAQ problems in the schools. In 1997, indoor air quality merged with health and safety issues within the Health and Safety Program (H&S).

Jurisdiction. H&S advises public school districts on a broad range of health and safety matters and approves capital expenditures for health and safety projects in schools. Indoor air quality is thus only a portion of the program. The office addresses general IAQ issues (not including temperature and humidity control), as well as specific pollutants such as radon, lead and asbestos.

Personnel. There is one person within H&S responsible for providing technical assistance and funding to schools for 25 hazards, including indoor air contaminants.

Recently proposed (but not enacted) legislation would have funded another position for the next fiscal year.

Financial Resources. Funding for H&S comes from general state treasury funds and local levy. Funding has been uniform over the past few years, and has consisted of roughly 70 percent local levy and 30 percent state aid. State aid is "equalized," meaning that a larger amount of state aid is distributed to school districts with less tax capacity and more students, according to a formula provided in Minnesota law.

For the current biennial period, H&S funding totals about $40 million. Agency officials estimate that this figure may climb to over $75 million for the next biennium. H&S is beginning to track the IAQ portion of these expenditures, through project codes used to identify the nature of the health and safety work being funded.

Thus far, the legislature has not appropriated any new money for the agency to implement some of the other activities mandated under the new IAQ law (see below).

2. Legislation, Regulations and Standards

Prior to the recently concluded special legislative session, the only legislation specifically addressing IAQ in schools was a 1993 law authorizing school districts to include radon testing as part of their health and safety plans. 1993 Minnesota Laws, Chap. 224, Art. 5 §44. This law was implemented jointly with the Department of Health, which collected the testing results.

In 1997, the Minnesota legislature passed an omnibus education bill which modifies and expands the responsibilities of the Department of Children, Families and Learning with respect to IAQ in schools. House File No. 1, 1997 Special Session, 6/26/97. Minnesota law requires a public review and comment process for construction and renovation projects over $400,000, and the school board's submission of a project for review must now demonstrate that "indoor air quality issues have been considered." Minn. Stat. §121.15. The Department is required to provide school districts with "information concerning indoor air quality."

A new statutory provision requires that prior to occupancy of a school at which construction or retrofitting exceeded $400,000 (and required public review and comment), the school board must verify that new or retrofitted HVAC systems were installed and operate according to design specifications. Minn. Stat. §121.1501. The school may be used for up to one year after construction or retrofitting, while the HVAC system is "improved to a level that is considered satisfactory to the system inspector."

Prior state law required each school district to adopt a health and safety program. The law was amended to require a "plan to monitor and improve indoor air quality" as part of each district's mandatory health and safety program. Minn. Stat. §124.83. This revised statutory section also authorizes school districts to identify and apply for the cost of health and safety improvements, including IAQ projects, without regard to number of students or square footage.

The new legislation directs the Department to develop IAQ information on three areas, in collaboration with the Department of Health, Department of Administration, school districts and "other public and private agencies":

- IAQ maintenance;
- Planning and construction to assure indoor air quality; and
- A public information plan for students, parents, staff, and other members of the public.

The legislation outlines 10 specific subject areas[3] that should be included in these three documents, and sets a deadline of Feb. 1, 1998 for completion of "the indoor air quality resource manual."

3. Activities

Through its grants, technical assistance and information sharing, the Department seeks to enable school personnel to bring all school facilities up to statewide standards (e.g., state building codes incorporating ASHRAE standards, proven ASTM standards, etc.). The Department's activities address construction, operation and maintenance practices. The agency also strives to assist local education officials in working with teachers, parents, and medical practitioners to identify and resolve IAQ-related medical

problems.

Funding for IAQ-related Projects. As noted above, the Health and Safety Program provides state and local monies for school district-initiated health and safety improvements, including IAQ projects.

The Department has published a guidance document describing its Capital Expenditure: Health and Safety Revenue Program, which includes a section on IAQ remediation projects. According to the guidance document, the agency will only fund IAQ remediation projects where a health and safety issue is established by a report (signed by a certified industrial hygienist or equivalent) which indicates that persons could be adversely affected. Projects that may be funded include repair / upgrade of HVAC systems to original design or current ASHRAE criteria; water remediation repairs to address mold build-up; purchase of high efficiency particulate arrestance (HEPA) vacuums for cleaning carpets; and removal of contaminated building components and furnishings.

Technical Assistance. In addition to requesting funding for qualified projects, school districts can turn to H&S for technical assistance in identifying and correcting IAQ problems in the schools.

Given its limited staff resources for providing technical support, H&S has entered into grant agreement contracts with nine "service cooperatives" around the state. The service cooperatives are wholly owned by the school districts, and were originally formed to create a more significant bargaining entity to negotiate services and supply contracts for the school districts (originally called education service cooperative units, or ESCUs). They are funded by fees from the school districts and profits (if any) from the goods and services they broker.

The Health and Safety program provides the service cooperatives with a small amount of funding, in exchange for which they conduct training sessions and help the local school districts identify hazards. In May, 1997, H&S staff trained the cooperatives on how to recognize good and bad indoor air conditions, so that the cooperatives can assist school districts in evaluating schools during the summer. In the fall, it is expected

that the cooperatives will be able to identify IAQ problems that may need resolution. They will evaluate IAQ issues in school buildings and provide the basic data for the agency's status report due to the legislature in 1998.

Information and Education. In May of each year, the Department sends a "policy letter" to school districts which alerts school personnel to potential IAQ issues, briefly suggests an action plan for various IAQ problems, and describes the criteria for receiving funding from the Department for health and safety projects. In new or emerging fields such as IAQ, additional policy and technical newsletters are sent out.

In response to the legislature's mandate, H&S staff plan to develop three to four policy manuals by January 1998, which will provide technical information relevant to IAQ in schools, and which will address enforcement of the new and revised statutory provisions. Among the practices to be addressed are: maintaining univents, establishing air exchange rates, ensuring that buildings are water-tight, establishing carpet maintenance schedules, maintaining HVAC filters, and regular vacuuming of walls.

IV. DEPARTMENT OF AGRICULTURE

A. Background

The Minnesota Department of Agriculture's mission is to work toward a "diverse agricultural industry that is both profitable and environmentally sound." The agency is charged with protecting public health and safety regarding food and agricultural products, which includes regulation of fertilizers and pesticides.

B. Division of Agronomy and Plant Protection

1. Background

Jurisdiction. The Division of Agronomy and Plant Protection is charged with enforcing the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and the Minnesota Pesticide Law. The Division addresses IAQ issues to the extent that pesticides and other FIFRA-regulated products are applied inside buildings.

Personnel. Approximately 15 people on the Division's staff devote some portion of their time to IAQ issues.

Financial Resources. The are no monies allocated specifically for IAQ issues within the Division. Agency officials estimate that up to five percent of the Division's $6 million budget deals with various aspects of indoor pesticide use.

2. Legislation, Regulations and Standards

The Department of Agriculture is authorized by the Minnesota Pesticide Law to carry out pesticide control activities. Minn. Stat., Chap. 18B, 18D, 18E. This law incorporates and references federal pesticide standards, regulations and orders.

Although there are no state laws or regulations requiring notice prior to indoor application of pesticides, agency officials note that the pest control industry in Minnesota has instituted a voluntary system of leaving "information and notification" notices at and after the time of indoor treatments.

3. Activities

The Division's indoor air priorities are set largely by pesticide product registration and labeling requirements and public complaints. The primary criteria for responding to complaints are human exposure concerns and health impacts of indoor pesticide use. Agency officials estimate that the Division responds to 6-12 complaints per year regarding the indoor application of pesticides.

In responding to complaints, the Division often works with other agencies. The Division relies heavily on the Department of Health for medical/technical assistance on individual complaints, and works closely with the Minnesota Poison Control Center (St. Paul Ramsey Medical Center), a nationally recognized institution. The Division also has informal arrangements with the University of Minnesota's School of Public Health for assistance in specific cases. In the future, the agency may focus increased attention on urban structural pesticide use, by evaluating case investigations on an annual basis internally and with EPA.

In addition to investigating complaints, the Division trains structural pest control operators, and develops and enforces worker protection standards in nurseries.

The Division has participated in an EPA-state advisory group (State-Federal Issue Research Environmental Group) and developed an issue paper for that group concerning the need for indoor air testing requirements and associated labeling requirements, for pesticides that can be applied indoors. Agency staff have been invited to participate in an EPA-State review of pesticide product issues connected to the recent federal Consumer Labeling Initiative.

V. DEPARTMENT OF PUBLIC SERVICE

A. Background

Minnesota's Department of Public Service is the central state agency in areas of energy, telecommunications, and weights and measures. The Department provides information to the public on these issues, ensures fair priced utilities, develops Minnesota's Energy Code. Indoor air quality issues are addressed primarily through the Energy Division. The three principal programs within that Division are Energy Technologies, Energy Programs and the Energy Information Center.

B. Energy Division

1. Background

Origin. Responsibility for the state's Energy Code has rested with various agencies in past years. It now resides with the Department of Public Service. IAQ issues have become more prominent as energy efficiency has improved and indoor air quality problems have increased. The techniques used to combat construction problems such as moisture in the soil have also increased indoor air problems, leading to a greater focus on indoor air quality as a component of the Energy Code.

Non-governmental organizations have been active in IAQ-related building issues in Minnesota and have raised public consciousness on the subject. For example, the local American Lung Association has worked with builders for a number of years on a

Healthy House program, which produces model houses that promote good indoor air quality.

Jurisdiction. The Department of Public Service has responsibility for promulgating administrative rules that contain the Energy Code for the state of Minnesota.

Although the Department adopts the Energy Code, the Department does not have authority to enforce the code. Enforcement of the state's Building Code, including the Energy Code, is carried out at the local level. Although local governments may opt out of enforcing the Code, counties encompassing 20 percent of the state's land and 80 percent of the state's population do enforce the Code. According to state officials, pressure from the insurance industry is changing this ratio, leading more counties to choose to undertake enforcement. Local governments are preempted from adopting their own energy and building codes.

Personnel. There are approximately 20 staff persons within the Energy Division. Most IAQ-related activities are carried out by staff who provide outreach and information (through the Division's Energy Information Center) and by staff who work on adoption of the Energy Code (through the Division's Energy Technologies program). Each of these two areas of activity involves approximately three staff persons, who spend a portion of their time addressing IAQ issues.

Financial Resources. As the state's principal energy office, the Department receives federal and state funding, as well as grants for special projects. None of its funding is specifically earmarked for IAQ matters.

2. Legislation, Regulations and Standards

The Department of Public Service is required by law to adopt rules providing building design and construction standards regarding heat loss control, illumination and climate control. Minn. Stat. §216C.19(8). The Energy Code is part of the state's Building Code (see Section V), and is applicable to residential and non-residential buildings with a minimum peak design rate of energy usage as specified in the Code. Minnesota adopted ASHRAE standard 62-1989 into it's Energy Code several years ago.

In 1994, the ASHRAE standard was adopted again, but the state regulation amended the national standard by stating that "infiltration does not satisfy the requirement for ventilation in residential construction." Minn. Rules §7670.0450.

The Energy Code is being revised again to mandate mechanical ventilation systems in residential construction. Minnesota's climate is a significant impetus for this initiative. According to state officials, the cold weather makes natural ventilation an inappropriate means for achieving acceptable residential ventilation standards.

Two public opinion studies also contributed to this new regulatory initiative. The Division sent out a survey to over 500 residential contractors a few years ago in order to ascertain their understanding of the Energy Code, as well as their perception of problems and needed changes in the Code. The survey yielded a response rate of over 50 percent. One theme of the responses was the need to require all new residential construction to install mechanical ventilation systems. In addition to this survey, one gas utility in the state carried out a study on carbon monoxide-related calls from the public and identified attached garages or warming up of vehicles in winter as a major contributor in setting off residential carbon monoxide detectors. These types of issues will therefore be addressed in the future residential ventilation rules.

3. Activities

Code Adoption. The Energy Division receives funding from the federal Department of Energy to involve stakeholders in the Energy Code development process. The Minnesota Builders' Association put together a residential ventilation task force, which includes the Energy Division, to draft a standard for ventilation in residential construction. A consensus has been reached on a workable standard, which may form the basis of the new rule.

Education. The Energy Division conducts various educational activities. These include developing brochures and conducting training sessions through the Building Code and Standards Division of the Department of Administration (see Section VI). The office also periodically sends "Builders' Updates" to a subscription list of over 11,000 persons, including licensed contractors, building inspectors and officials. These updates have covered subjects such as requirements for ventilation and air tightness,

controlling moisture migration in wall systems and ceiling assemblies, and relief of moisture. The Division's Energy Information Center has published informational brochures for the housing consumer, such as the "New Homes Guide" and the "Home Moisture Guide."

VI. DEPARTMENT OF ADMINISTRATION

A. Background

The Department of Administration consists of five bureaus and 22 divisions that provide an array of business management and administrative services for the executive branch of the state government. Indoor air quality issues are addressed by the Division of Building Codes and Standards.

B. Division of Building Codes and Standards

1. Background

Jurisdiction. The Division of Building Codes promulgates the state Building Code. The Code governs construction of buildings throughout the state and is enforced at the local level, at the option of local governments. Local governments are preempted from adopting their own codes.

Personnel. The Division has 17 staff, who at times address IAQ issues.

2. Legislation, Regulations and Standards

Minnesota law authorizes the Department of Administration to establish and administer a state building code. Minn. Stat. §16B.59. The Energy Code, which includes ventilation requirements and is developed by the Department of Public Service, is included in the Building Code (see Section V). The Division of Building Codes and Standards thus serves a coordinating role in the promulgation of this aspect of the Building Code.

3. Activities

The IAQ-related activities of the Division include: promulgation and adoption of building codes; plan review and approval; and technical assistance to municipal officials, design professionals and contractors.

The Division also certifies local officials who will be enforcing the building code. As part of that responsibility, the office conducts training and provides technical assistance to local enforcement officials. The Division plays a lead role in providing this training and technical assistance, often working with Energy Division staff, who provide technical details on ventilation/IAQ aspects of the building code.

The Division offers two training programs for local building officials, which are given at 12 locations around the state. This Division also participates in a five-day seminar for building officials which is facilitated by the University of Minnesota. According to state officials, attendance at this seminar is growing every year, with 731 people attending in 1997.

VII. DEPARTMENT OF EMPLOYEE RELATIONS

A. Background

Through its Safety and Industrial Hygiene Unit, the Department of Employee Relations offers safety and industrial hygiene consulting services to Minnesota state agencies. The Safety and Industrial Hygiene Unit is organized under the Workers' Compensation Unit within the Employee Insurance Division of the Department.

B. Safety and Industrial Hygiene Unit

1. Background

Origin. The Safety and Industrial Hygiene Unit has been in existence for about ten years, with most of its IAQ work taking place since 1990.

Jurisdiction. The Safety and Industrial Hygiene Unit investigating a broad array of IAQ issues, in addition to providing other safety and industrial hygiene services. These services are available to agencies located in state-owned and leased buildings. The state owns approximately 4700 buildings and leases approximately 420 additional spaces.

Personnel. The Safety and Industrial Hygiene Unit is staffed by two industrial hygienists, an ergonomics professional and a safety specialist. The Unit's two industrial hygienists spend approximately 75 percent of their time on IAQ issues.

Financial Resources. The Unit is funded through administrative fees paid to the Department of Employee Relations' Workers Compensation program by other state agencies. The Unit estimates that $100,000-125,000 per year of the Unit's funding is devoted to IAQ investigations through staff salaries, supplies, training, and monitoring equipment. Any laboratory fees associated with the IAQ investigation are paid by the requesting agency.

2. Legislation, Regulations and Standards

The Safety and Industrial Hygiene Unit relies on the standards promulgated by the Department of Labor and Industry (see Section VIIIA), including a ventilation requirement of 15 cfm. of fresh air per occupant. Additionally, the Unit relies on standardized lease language for leased spaces, an air quality manual developed by a state task force, and accepted industry standards and practices.

3. Activities

The Safety and Industrial Hygiene Unit provides safety and industrial hygiene consulting services to other state agencies requesting information or services. For IAQ concerns, the Unit conducts a general investigation with an agency representative. The investigation may include sampling for various items, including microbial contamination. Following its inspection, the office sends the requesting agency a report containing conclusions and, where appropriate, specific corrective action recommendations.

The Department of Employee Relations has no enforcement authority in this area and does not have authority or resources to perform any needed corrective action. Building maintenance and repair are generally the responsibility of the agency that owns the building. The Safety and Industrial Hygiene Unit attempts to follow up with the responsible agency to encourage corrective action.

In 1996, the Unit conducted a total of 75 IAQ investigations for various state agencies. Ventilation, humidity and temperature problems were the most common cause of IAQ concerns. Microbial contamination was a concern in 12 percent of the cases, and indoor and outdoor contaminant sources a problem 20 percent of the time.

The Safety and Industrial Hygiene Unit also worked in partnership with the Minnesota Department of Administration's Indoor Air Quality Task Force to create an IAQ guidance document for state agencies. The document provides users with design parameters for building construction or renovation, building operation and maintenance procedures, and complaint resolution recommendations. The Safety and Industrial Hygiene Unit anticipates updating the document on a periodic basis to reflect changes in industry practices and procedures.

VIII. OTHER AGENCIES

A. Department of Labor and Industry

The OSHA Health Section within the Department of Labor and Industry has jurisdiction to enforce federal OSHA requirements in public and private workplaces, other than those falling under federal jurisdiction. Minnesota has adopted by reference the OSHA requirements. State officials note that since Minnesota is a cold climate state, there has been long-standing interest in regulating temperature control and ventilation in closed occupancy conditions.

The Department has adopted some state-specific standards and requirements that relate to indoor air quality, which include:

- 15 cfm of fresh air / occupant (in heavily occupied rooms);
- No more than 200 feet / min. air impinging on the worker;

- Minimum temperature of 65° for non-strenuous work indoors and 60° for strenuous work indoors;
- Maximum temperature/humidity conditions based on work load and measured WBGT (wet bulb globe temperature);
- Quarterly monitoring for carbon monoxide when running powered industrial trucks indoors; and
- Exhaust testing of equipment (such as lift trucks) during equipment maintenance.

The principal activity of the office is enforcement of OSHA regulations. The office also has a Consultation program. According to agency officials, however, IAQ issues are not emphasized as part of the office's activities, and the industrial hygienists in the office spend a very small percentage of their time on IAQ issues.

B. Minnesota Pollution Control Agency

The Minnesota Pollution Control Agency implements a broad range of environmental programs throughout the state. The office does not have direct authority over indoor air quality issues, although it responds to inquiries and complaints about outdoor pollutants (from factories, refineries, and feedlots, for example) affecting indoor air. Complaints are handled by an Air Quality Complaints Line, and IAQ-related questions and concerns are referred to the Department of Health's Indoor Air and Lead Unit.

The agency sometimes encounters IAQ-related issues in the context of hazardous waste cleanups. According to state officials, various programs offices within the Pollution Control Agency (e.g., tanks, spills, hazardous waste) contact the Department of Health for guidance on whether and how to address IAQ issues in individual situations.

VIII. OBSERVATIONS

A. Structure and Focus of State IAQ Programs

Minnesota is notable for its early attention to indoor air quality. Consolidation of most IAQ issues within Department of Health has provided the context for the state's

programs over the last ten years. IAQ activities relating to schools may become increasingly prominent in the wake of new state legislation in this area.

Jurisdiction

While a number of state agencies in Minnesota have responsibilities that include indoor air quality issues, most indoor air activities are concentrated in a single agency, the Department of Health. In 1989, the state created the Indoor Air and Lead Unit within the Department, thereby unifying the agency's scattered activities addressing indoor air quality. The Unit has 22 employees and has authority to carry out activities relating to most IAQ issues and problems, except those involving asbestos.

Other state offices with notable involvement in indoor air quality issues focus on specific types of buildings, activities or pollutants:

- Department of Children, Families and Learning (schools);
- Department of Administration and Department of Public Service (building code development);
- Department of Agriculture (pesticides);
- Department of Employee Relations (state-owned and leased buildings); and
- Department of Labor and Industry (workplaces).

Interagency Coordination

Due to the concentration of program activities in one office, interagency coordination has been carried out mainly through individual contacts between the Department of Health and other agencies on case or problem-specific matters. For example, the Indoor Air and Lead Unit has worked with the Department of Agriculture on health-related problems connected to pesticide applications, and with the Department of Children, Families and Learning on radon testing and other school IAQ initiatives. Offices such as the Minnesota Pollution Control Agency rely on the Department of Health for its expertise in indoor air issues.

An interagency taskforce recently developed an Air Quality Guide that contains IAQ guidelines for managing state buildings. The Guide is being distributed to all state agencies that manage or operate buildings. Agencies represented on the taskforce included the Department of Administration, the Department of Employee Relations, the

Department of Health, and other agencies with substantial property (for example, the Departments of Human Services and Transportation).

In addition, the two state agencies that are responsible for adopting the Energy Code and the Building Code, which include ventilation standards, work closely in developing the codes, as well as conducting training on the codes.

Interagency coordination on IAQ issues is required under the new state education legislation. That law calls on the Department of Children, Families and Learning to work with the Department of Health and the Department of Administration to coordinate in developing technical information manuals on IAQ subjects.

Activities

Education and training are common IAQ program activities among state agencies. The Indoor Air and Lead Unit, with a number of staff members who are specially trained in health education, has undertaken many public education campaigns and published written materials on a variety of indoor air issues. Training and education of school officials and building code officials are also priorities for DCFL and the state building code agencies.

The Indoor Air and Lead Unit generally does not provide technical assistance to facilitate resolution of specific IAQ problems in residences or private businesses, but rather relies on the private sector to provide those services. Non-governmental organizations also are involved in responding to problem-specific public inquiries. Limited technical assistance and consultation on IAQ problems is provided by DCFL (schools) and the Department of Labor and Industry (workplaces). The Department of Employee Relations undertakes inspections and provides consultation on IAQ problems in state-owned and leased buildings. Building repair and maintenance, however, is usually the responsibility of the agency that owns the building.

IAQ-related enforcement activities are carried out mainly in the areas of radon, environmental tobacco smoke, enclosed arenas and building codes. Local governments play the central role in enforcing the state Building Code as well as the state smoking

law. While the Department of Labor and Industry (OSHA Health Section) has regulatory authority over the workplace, IAQ issues are not a significant focus of the office's enforcement activities.

Various Minnesota agencies have been planning new IAQ-related activities for the short and long-term. In the near future, a significant change will be increased attention to IAQ in schools. This priority has been incorporated into legislation, following a rise in public awareness and concern over the subject. Another notable initiative is the development of residential ventilation standards.

The Indoor Air and Lead Unit expects to begin working on its first three to five-year plan, which will establish priorities and goals for the office. The office anticipates many IAQ activities in the next year related to the extensive flooding that occurred this spring. Over half of the state's counties were flooded by a 500-year flood, affecting drinking water plants and, in some cases, entire cities. Mold problems are among those expected to be addressed by the state's indoor air program.

Department of Agriculture officials also anticipate that the agency will develop a proactive public information and awareness program within the next two years about the dangers of using methylparathion inside buildings.

State-Local Relationships

State IAQ activities generally incorporate a significant degree of contact with local governments. State programs seek to provide support in different ways to local officials who are undertaking indoor air activities. For example, the Indoor Air and Lead Unit has emphasized the need for coordination with local government by providing funding to local governments and by funding and facilitating the Minnesota Indoor Air Coordinators for the past three years. This group of mainly local officials has served as a vehicle for sharing information about IAQ issues and programs.

The Department of Children, Families and Learning supports local school boards primarily by providing state aid for school safety and health projects, and also through training and education. The Department of Administration and Public Service also emphasize training of local code officials who enforce the Building Code.

B. Factors Influencing the Development and Implementation of Minnesota's Programs

Minnesota's Indoor Air Problems

Minnesota's cold climate is a key factor in the high level of indoor air program activity in the state. The fact that people spend so much time indoors has helped create public awareness and concern over the indoor environment. Tight building construction, as well as the recent flooding in the state, has led to concerns about indoor air quality, particularly with respect to mold problems. The recent GAO report citing Minnesota schools as among the worst in indoor air quality was an impetus for the new legislation addressing indoor air quality in schools.

Legislation, Regulations and Standards

The adoption of indoor air legislation and regulations has been an important factor in the development of state programs in Minnesota. Indoor air laws have generally addressed specific subject matters, rather than broad indoor air quality issues. Laws and regulations in the areas of environmental tobacco smoke and indoor air pollutants in enclosed sports arenas have been in effect for over twenty years. Implementation and enforcement of these measures are among the central components of the Department of Health's indoor air program.

Minnesota has adopted regulations establishing various standards relating to indoor air quality. Among these are standards relating to indoor pollutant levels in enclosed sports arenas and in the workplace. The state-wide Building Code incorporates the state Energy Code, which contains a modified ASHRAE 62-1989 standard. Minnesota is currently taking the significant step of developing regulations to require mechanical ventilation in residential housing. This initiative has been motivated by the cold climate, which precludes natural ventilation, as well as research into public opinion and carbon monoxide hazards.

In 1997, as part of an omnibus education measure, the state enacted requirements for addressing IAQ in schools at the state and local levels. School districts are now required to develop IAQ components to their health and safety plans, as well as

demonstrate that IAQ issues have been addressed in new construction plans. The state is required to develop technical information for use by local school officials. While the state does provide funding for school health and safety projects, the question remains whether the state will allocate additional funds to the Department of Children, Families and Learning for implementing the law.

State-Federal Relationships

Minnesota's central IAQ program has received considerable federal funding from EPA and HUD for its indoor air and lead work. The program is notable for having used (through agreement with EPA) radon grant funding to address broader IAQ issues as well. Agency officials have sought actively to obtain federal grants, and officials note that the program's reliance on this funding is likely to continue.

Other agencies, such as the Department of Labor and Standards (workplace health) and the Department of Public Service (energy) receive general federal funding to implement their programs, which include some IAQ-related activities.

State agencies have also used research and materials developed by the federal government. In particular, the Indoor Air and Lead Unit has developed seminars around the IAQ Tools for Schools materials distributed by EPA.

Stakeholder Participation

Public opinion has been an important factor in shaping the state's IAQ activities. This has been particularly true with respect to indoor air quality in schools. The Department of Public Service (Energy Division) carried out a survey of building officials to gauge understanding and views of the Energy Code. The Indoor Air and Lead Unit uses workshops and focus groups to help it design new public information and education campaigns. The Unit has also undertaken public surveys to identify effective means of communicating its IAQ message.

Another important element of the state's activities in the area of indoor air quality is the extensive involvement of academic institutions and non-governmental groups. For example, the University of Minnesota has been active on IAQ issues in the

state for almost 20 years, starting with the IAQ impacts of low-income weatherization and radon, and evolving to address current IAQ issues in the state such as mold and carbon monoxide. University staff are now extensively involved with the public education component of the state's IAQ program, receiving funding from various in-state sources to develop trainings and pamphlets on residential and school IAQ issues.

In addition to the academic presence in this area, the American Lung Association of Minnesota is involved in many indoor environmental issues in Minnesota. The organization addresses specific pollutants, including radon, carbon monoxide and environmental tobacco smoke, and organizes "healthy house" educational programs. The ALA develops and produces workshops on substantive issues (e.g., radon-resistant new construction, secondhand smoke and radon) and has produced an IAQ curriculum for use in the schools. It also fields questions from the public and receives many site-specific inquiries.

The activities of these and other organizations are undertaken in fairly close coordination with state programs. The Department of Health's Indoor Air Quality Coordinators groups includes the University of Minnesota and the ALA, as well as another organization active in indoor air issues, the Minnesota Public Interest Research Group (MinnPIRG).

In addition to these general coalition building efforts, stakeholder involvement is driven by the state's administrative procedures law. The state Administrative Procedures Act mandates public involvement in all rulemaking; it defines which interest groups must be included in any advisory group that assists the agency in developing proposed regulations. It is the Department of Health's policy to have an external advisory group when developing regulations, so that concerns can be anticipated and avoided. For the smoking regulations, the advisory group included stakeholders including (but not limited to) the state Chamber of Commerce, public interest (advocacy) groups, unions, tobacco groups, and local governments.

Resources

Financial resources targeted at indoor air issues within the Department of Health have been a key to the development of extensive indoor air activities in that agency.

Federal grants have been a critical source of this funding. The Department of Children, Families and Learning provides state financial assistance for local school health and safety projects (including IAQ projects); however, the DCFL budget for agency activities to support local schools is very limited. This may change in the future, in light of the new IAQ and schools legislation.

ENDNOTES

1. According to officials, the law aimed to bring pre-existing regulations with the state's Health Consolidated Enforcement Act. That law is described further below.

2. One-hour average air concentrations of not more than 30 parts of carbon monoxide per million parts of air by volume (30 ppm), and one-hour average air concentrations of not more than 0.5 ppm of nitrogen dioxide.

3. These are: (1) process standards for school districts and DCFL to follow when addressing IAQ concerns; (2) information materials for a model school district IAQ program; (3) training needs for school district employees; (4) procedures for school districts when disseminating IAQ information and test results to parents, teachers, and other persons; (5) IAQ considerations under the review and comment process for school buildings, specific evaluations of proposed construction standards and materials, to be included in the review and comment standards; (6) building systems maintenance and housekeeping practices required to ensure adequate IAQ; (7) architectural, engineering, maintenance engineering, and other design practices to positively affect IAQ; (8) regional and state resources available to assist districts with information and training needs of school staff, parents, and community; (9) regional and state resources available to assist districts with medical evaluation relative to IAQ complaints; and (10) recommended steps a district should take to attain a satisfactory level of IAQ.

Chapter Six

*

Vermont

I. INTRODUCTION

A. Political and Demographic Features

Vermont's population of 584,771 is sparsely distributed over 14 counties and 9,609 square miles. Vermont is a very rural state, with a small state government presence. There is no county government structure, and local governments or municipalities are very small. The state's largest city, Burlington, has 38,392 residents, while Montpelier, the nation's smallest capital city, has a population of 8,400.

B. Geographic Features and Indoor Air Quality Issues

Known for its ski slopes and beautiful mountain vistas, Vermont has a rocky soil type with a predominance of granite. While state officials at one time suspected that the rocky formations would contribute to high radon levels, radon is not now considered a major indoor air quality concern in the state. The state has focused on general indoor air quality issues in state buildings and public schools.

C. Political and Legislative Highlights

Vermont has a long history of protecting the public from environmental tobacco smoke. State laws restrict smoking in the workplace and in public places. In June, 1997, the Governor signed into law Senate Bill 156, which prohibits anyone under 18 years of age from possessing or purchasing tobacco products.

In addition to legislation on environmental tobacco smoke, the Vermont legislature and the executive branch recently have undertaken a broad-based effort to develop policies and programs addressing general indoor air quality issues in schools and state buildings. These efforts are partly the result of several incidents and events that focused official attention on the issue.

One of the first incidents occurred in 1995, when state agencies moved into a newly built office building that had been constructed through a state/private venture with a bank. Immediately after entering the building, state employees began to get sick. The state's investigation revealed a number of problems, and the state was required to retrofit the building in order to use it again. Tremendous media attention on the building raised interest within the legislature in the problem of indoor air quality in public buildings.

At about the same time, the Vermont Department of Personnel sent a "wellness" survey to all state employees. Although no questions were asked about indoor air quality, approximately 900 of the 3100 respondents included comments about indoor air quality problems. During the 1995 legislative session, an IAQ incident in a high school also sparked interest in the quality of air in public schools.

As a result of these and other events, the state administration and the state legislature began to explore the issue of indoor air quality. First, the Vermont State Employees' Association (VSEA) and the state administration entered into an agreement to form an Indoor Air Quality Committee to address emerging issues related to poor indoor air quality faced by state employees in the workplace. Second, during the 1996 legislative session, testimony was taken to determine the magnitude of the IAQ problem in state buildings and public schools. Bills were introduced to create indoor air quality standards for schools and state buildings. These bills encountered problems with funding as well as a lack of certainty as to what the standards should be.

As the VSEA and the state administration collaborated on the Indoor Air Quality Committee, it became clear to those involved that the school community should be included on the Committee. Legislation introduced to create a committee to study both schools and state buildings was not enacted, due in part to its inclusion with measures aimed at weakening the state's smoking laws and in part to the view that the work could be undertaken on a voluntary basis.

Drawing upon the charge from the draft legislation, the *Indoor Air Quality Committee on Schools and State Buildings* (IAQC) was formed with representatives from the Departments of Buildings and General Services, Personnel, Labor and Industry, Health, and Education, as well as representatives from the VSEA, the Vermont

Education Association, the Vermont Children's Forum, and an IAQ expert appointed by the governor.

The IAQC held its first meeting on October 12, 1996, and has held four subsequent meetings. While it has no official legislative mandate or charge, the Committee agreed to submit an interim report to the Legislature in early 1997 and a follow-up report in 1998. The vision for the full Committee is to develop protocols and specific design standards to achieve high quality indoor air. Although these standards would not require legislative approval, state officials indicate that legislation may be important to ensure effective implementation of the measures.

In an attempt to determine the scope and seriousness of the problem and the areas of greatest concern, the IAQC first directed the Department of Personnel to develop a survey for school and state employees. In May 1997, the Department of Personnel distributed the survey to the 8,500 teacher members of the Vermont National Education Association (through the Association's newsletter) and all 7,000 state employees (to their home addresses). The Department has received 3,000 responses from state employees and 500 from teachers, and is currently entering the data. The survey, which is confidential, requests information on the number of hours worked in a building, personal health questions, types of office machines, chemicals, books and documents used in the workplace, as well as other matters.

After the Committee began to meet, it soon became apparent that the IAQ issues and the populations in schools were quite different from those in state buildings. Thus, in 1996, the Committee established two subcommittees, which meet separately about once per month and jointly two times each year.

The *Subcommittee on Schools,* which is chaired by the General Counsel of the Department of Education, has 12 members. The members include representatives from the teachers' union, parents, school board associations, superintendents' associations, engineers, and architects. This Subcommittee has in turn broken into two separate groups: 1) the Existing Building Group, which will examine procedures for receiving complaints, investigating complaints and obtaining corrective action; and 2) the New Construction Group, which will examine design standards for new school construction. The Subcommittee will also address IAQ issues concerning additions to and

renovations of existing schools. The Subcommittee expects to have its report finished by the end of 1997.

The *Subcommittee on State Buildings* is currently chaired by the Manager of the Vermont Occupational Safety and Health Administration program, which is a part of the Department of Labor and Industry. The Subcommittee is in the process of developing a response protocol for employee complaints, as well as maintenance and design standards. The Subcommittee has already directed that the Department of Buildings and General Services change the type of paint used in state buildings and has begun to look at specific cleaning materials.

D. Overview of Governmental Structure for Addressing IAQ Issues

The Department of Health plays the lead role in implementing indoor air programs in Vermont. That agency is a contact point on nearly all indoor air issues, regardless of building type. The agency's activities are largely non-regulatory, except in the areas of environmental tobacco smoke and occupational health. Although the Department of Buildings and General Services is the central agency for addressing IAQ in state owned or leased buildings, the Department of Health is contacted when biological contaminants are involved.

Specific indoor air quality complaints received by state officials are channeled to the appropriate office in a "triage" fashion depending on the source of the complaint. State employees' complaints are directed to the IAQ coordinator within the Department of Buildings and General Services. Questions and complaints from the general public, including those involving schools, are directed to staff in the Vermont Department of Health.

II. VERMONT DEPARTMENT OF HEALTH

A. Background

While the Vermont Department of Health has no specific legislative mandate to address indoor air quality issues, it does work on these issues under its general duties and powers relating to health concerns.

Indoor air activities are carried out within the Department's Division of Health Protection. That Division houses approximately 50 employees and is divided into four separate offices. The Office of Environmental Health has jurisdiction over general IAQ issues. The Office of Occupational and Radiological Health houses the state's Radon Program and also addresses workplace health issues. The Division of Health Protection also includes the Office of Emergency Medical Services and the Office of the Medical Examiner, which do not undertake IAQ-related work.

B. Office of Environmental Health

1. Background

Origin. In 1994, the Department of Health's Chief Toxicologist obtained a grant to fund a toxic risk assessment study on IAQ issues. The study concluded that specific investigation and research was needed to identify IAQ problems in state buildings and public schools. Shortly thereafter, the Chief Toxicologist trained a staff person within the Office of Environmental Health (OEH) to handle IAQ questions and complaints, which began the Department's first formal IAQ program.

Jurisdiction. The Office of Environmental Health addresses general indoor air quality issues, including environmental tobacco smoke, in schools, residences and workplaces. Lead and asbestos issues are handled by other staff persons within OEH, while radon is handled by a separate Department of Health office.

Personnel. OEH has approximately 24 on staff, with one staff person working full-time on IAQ issues. EPA plans to station an IAQ specialist in Vermont soon for a four-year period. The Department sees this as an excellent opportunity to develop more expertise in its staff and to improve its IAQ response.

Financial Resources. Funding for the IAQ staff person in OEH is now provided by a $30,000 grant from the Vermont Occupational Safety and Health Administration (VOSHA), matched by $30,000 in Department of Health funds. This funding arrangement was agreed upon in March, 1997 on the condition that the OEH staff person would continue to handle IAQ-related complaints from employees in the private workplace (see Subsection 3, below).

2. Legislation, Regulations and Standards

The Department of Health is authorized by law generally to supervise and direct the implementation of state laws relating to public health. State law defines a public health hazard as "potential harm to the public health by virtue of any condition or any biological, chemical, or physical agent." Vermont Statutes Annotated (V.S.A.), Title 18 §§1,2.

The only state laws relating directly to indoor air that are implemented by OEH are those addressing smoking in workplaces and in public buildings. In 1987, the general assembly passed legislation "to protect employers and employees by restricting smoking in the workplace." V.S.A., Title 18 §§1421-1428. The law requires employers to prohibit smoking throughout the workplace or to designate enclosed smoking areas. The Department of Health is authorized to enforce the law and issue sanctions for violations.

In 1993, the Vermont legislature passed one of the most stringent laws in the country banning smoking in public places. V.S.A., Title 18 §§1741-1746. The law defines public places broadly, to include virtually all businesses, whether publicly or privately owned and whether operated for profit or not. It includes such places as hotels, restaurants, arcades, bars, barber shops and means of transportation, among others. As of July 1, 1995, only businesses issued a "cabaret" license were allowed to designate a smoking area in their facility. The law explicitly does not preempt municipal smoking ordinances that are "at least as protective of the rights of nonsmokers" as the state law. V.S.A., Title 18 §1746.

3. Activities

Vermont's IAQ program is still in its early stages of development. The program does not have enforcement authority over general IAQ matters. The focus of program activity has been in providing information and assistance. Although OEH has not established a formal public education program, the office responds to complaints and questions from the public. Its authority extends to investigating the complaint, compiling information and making recommendations.

Direct Assistance. The OEH staff person receives IAQ inquiries and complaints and, in certain instances, goes into the field to do limited testing and interviews. After consultation with the Chief Toxicologist, the staff person further defines the problem and makes recommendations. If the problem is complex, OEH generally recommends that the individual consult with private IAQ professionals. The Department of Health provides a list of private companies that perform IAQ testing, but makes no recommendations among those companies. When appropriate, the OEH staff person also distributes documents produced by EPA, such as *Building Air Quality: A Guide for Building Owners and Managers* and IAQ Tools for Schools kits. OEH receives calls from a variety of sources:

- Private Workplaces. Under an agreement with VOSHA, OEH receives inquiries from employees concerning private workplaces. Although officially VOSHA has jurisdiction over the private workplace (see Sections IIC and III), this referral protocol was instituted over a period of time when VOSHA discovered that its health standards for air contaminants were intended for industrial settings and were not useful in office situations. Following up on employee complaints, VOSHA performed inspections in private buildings and schools, but did not issue citations because the contaminant levels were never found to exceed the Permissible Exposure Levels contained in the standards. Since the early 1990's, VOSHA has referred most of its indoor air complaints to OEH for investigation. OEH uses IAQ investigation guidelines prepared by EPA and the National Institute of Occupational Safety and Health. If OEH finds a chemical contaminant in excess of VOSHA standards, it refers the complaint back to VOSHA for enforcement.

- Public Schools. Referrals regarding public schools stem from the IAQC Subcommittee on Schools, or directly from parents, teachers, or school administrators.

- State-owned or leased buildings. OEH also may receive referrals from the Department of Buildings and General Services (DBGS) regarding certain IAQ complaints from state employees in state owned or leased buildings. Under an informal protocol, the DBGS IAQ coordinator may decide to refer a state employee complaint to OEH if he determines that the issue is medical or biological (such as VOC emissions from carpeting) rather than mechanical (such as a problem with the ventilation system).

A more formal protocol for these referrals is now being developed through the Indoor Air Quality Committee.

• Private residences. In response to inquiries from the public about private residences, OEH generally sends out information, such as American Lung Association fact sheets or guidance from EPA or the U.S. Consumer Product Safety Commission. The agency will not go into a private residence to investigate, but may advise the caller about particular household consumer products, or if appropriate, provide a list of private IAQ consultants.

Enforcement (environmental tobacco smoke). Approximately 10-30 percent of the IAQ staff person's time is spent on formal complaints from employees on smoking in the workplace, pursuant to the state law restricting smoking in the workplace. According to that law, an employee may file a complaint with the Department of Health, and the Department may impose an administrative penalty of $100. The IAQ coordinator responds by first sending a letter attempting to resolve the situation and/or scheduling a site visit. The Department's general approach to enforcement is to work with the company to achieve voluntary compliance. Complaints about smoking in public schools and state buildings are handled by other agencies.[1]

Under the state law prohibiting smoking in public places, implementation rests with the proprietor of the establishment, who is authorized to ask the offending smoker to extinguish his cigarette or to leave the premises if he or she does not comply. The legislature provided no funding for public education or other state implementation of the law. The Department of Health, however, used its own funding to mail over 5,000 letters to various businesses informing them of the upcoming requirements. The Department designated an administrative support staff person in the Office of Environmental Health to field complaints and information requests. This staff person initially received approximately 50 calls per day when the legislation was passed in 1993, and currently fields about five calls per day. The office has developed a complaint form and a report of contact form to document staff contact with allegedly offending businesses.

Upon receiving a complaint, OEH determines through an investigation the identity of the owner of record and the address of the establishment. OEH initial

contact is through a form letter asking the owner to abide by the statute and to provide the Department with an "assurance of discontinuance" of the offending practice. According to agency officials, approximately 50-60 percent of the establishments voluntarily send in the assurance, which closes the case. If the business does not reply, the office contacts the owner by phone and attempts to obtain the assurance. Three cases have been referred to the General Counsel of the Department of Health for legal resolution. In the last session of the state's General Assembly, 11 different tobacco bills were introduced seeking exemptions from this law. None were enacted.

C. Office of Occupational and Radiological Health

The Department of Health's Office of Occupational and Radiological Health (OORH) addresses occupational health issues in private workplaces. The Vermont Occupational Safety and Health Administration is a combination of operating units from two state agencies -- the Department of Labor and Industry and the Department of Health. The Department of Labor and Industry, in addition to providing overall administration, management and enforcement of the program, carries out safety compliance inspections, safety consultation and safety training. The Department of Health, through OORH, carries out health compliance inspections, health consultation and health training as a subgrantee. VOSHA health regulatory inspections concerning indoor air quality are conducted following federal (OSHA) inspection policy guidance. VOSHA health voluntary consultations follow similar guidance. As noted above, however, it is usually the Office of Environmental Health that provides direct assistance on workplace IAQ complaints, since violations of VOSHA standards are normally not implicated in cases involving non-industrial workplaces.

The principal IAQ-related work of OORH is its Radon Program, which is described in detail below.

1. Background

Origin. Although no formal radon program had yet been established, the Vermont Department of Health began working in the radon field as early as 1981 when it carried out some radon testing in homes. State health officials were interested in learning whether granite, a prominent geological presence in Vermont, contributed to

radon levels. It was not until 1990, however, when EPA provided 75/25 matching grants for state radon programs, that Vermont established a formal radon program. Because of a state hiring freeze, no new employees were hired to perform radon activities until 1993. As a result, the state decided to foster cooperative partnerships with private organizations to help implement the radon program goals. These partnerships continue today.

Jurisdiction. OORH addresses radon issues broadly. The office works with other agencies on radon problems in certain types of buildings -- e.g., schools and state-owned or leased facilities.

Personnel. The Radon Program hired a full-time Radon Program Coordinator in 1993.

Financial Resources. The annual budget for the Radon Program is approximately $180,000, half of which comes from a matching grant from EPA and half from the state's general funds.

2. Legislation, Regulations and Standards

After radon first came to widespread public attention in about 1988 and EPA urged states to identify a single contact on the issue, Vermont's Governor designated the Department of Health as the lead agency for radon programs in Vermont. The Department's authority over radon issues stems from this proclamation as well as from a state law that grants the Department authority over any ionizing and non-ionizing radiation. V.S.A., Title 18 §1652. No legislative provisions address specific program activities such as radon testing, professional certification, or real estate disclosure.

Two to three years ago, the Vermont Legislative Counsel's office drafted proposed legislation for mandatory radon testing of certain housing prior to transfer. The legislation also would have required that testing be performed only by individuals who had received training through an EPA-recognized program, such as Rutgers University. This legislation received little support and was never referred to committee. There have been no recent legislative initiatives in the radon area.

3. Activities

Research. In October 1989, Vermont participated in a joint EPA / state radon survey. Calls were made to approximately 2,000 private individuals, with about 750 responses. As a budget-saving measure, and because of the lack of a radon program coordinator, Vermont utilized volunteers from the Retired Seniors Volunteer Program to perform the survey. According to state officials, subsequent radon testing has shown the 1989 survey projections to be accurate, and the report still serves as a valuable reference. Most areas of Vermont are categorized as Zone Three -- areas of lowest radon potential. Between two and five percent of all structures in Vermont are projected to have yearly average radon levels above the EPA action level guidance of 4 pico / Curies per liter of air. The Vermont Geologist's Office provides consultation concerning geologic formations and their relationship to radon test results.

Testing. One of the main priorities for Vermont's radon program is the measurement of radon levels in private homes. Its goal is to test 40 percent of Vermont's homes by the year 2000. In 1996, the program added test results from 1,500 detached homes, and currently has an additional 600 tests in progress. The Department staff concluded that the services of a data handling consultant may be necessary to update methods for tracking test results.

One method that Vermont has used to reach its testing goals is to utilize private organizations. One of the most successful cooperative partnership endeavors has been the work of the Fairbanks Museum in St. Johnsbury, Vermont. The Fairbanks Museum, noted for its programs in science and natural history, developed its Radon Education Program in 1994 in cooperation with the Vermont Department of Health. It first developed a radon education presentation, curriculum materials, and a Radon Education Workbook. In January 1996, the Department provided the Museum with a $16,655 grant, matched by the Museum, for its Radon Education Program. With this support, the Museum delivered its radon science presentation in 14 schools in 1996-97 and provided approximately 1,200 detectors to students for home testing, ninety percent of which have been returned for laboratory analysis. Results will be included in the statewide database. The Museum has also stepped up its efforts on educational outreach through a letter recently sent to 1,600 licensed home day care providers in their professional publication.

In an effort to perform more testing in low-income housing, the Radon Program initially tried to develop a partnership with weatherization professionals -- those who perform weatherization services in low-income housing as part of a federal-state program. The Program contacted weatherization providers to seek their assistance in distributing radon information and test kits to their clients. This effort met with a poor response, and the Program then turned to the Vermont Department of Health's Community Public Health Nurses, who provide home visits to those receiving federal Medicaid program assistance. After providing the nurses with radon training, the Program supplied them with radon detectors to place into the homes they visited and to retrieve on a subsequent visit. The Radon Program paid for some of the expenses and overhead for the nurses. According to officials, this program has proven to be extremely successful in eliciting data from low-income areas. State officials attribute the results to the health professionals' primary focus on the health of their patients. The Department has also targeted low-income households via the Community Action and Head Start offices, focusing on regions of the state where the Department needed additional radon data.

Another element of the Vermont radon program that state officials believe has contributed to the high return rate of the radon tests is the institution of a coupon program. Early in the history of Vermont's radon program, the Department distributed free radon detectors at health fairs or other events, but very few were returned. The Department now provides a coupon that the individual must submit for the free detector. According to state officials, this method generates a high rate of return and saves on the cost of purchasing detectors that go unused.

The Radon Program provides technical information and support to the Vermont Department of Education, and discussions of future radon monitoring of school buildings continue. The Program provides EPA publications on school construction and radon measurement and has met with the director of the School Improvement Program to discuss the roles of each agency in school radon issues.

Education. In addition to the activities described above, an important focus of the Radon Program's outreach activities is on individuals holding Vermont professional licenses. The outreach program consists initially of contacting licensed professionals and offering them a complimentary radon detector for their own use. These

professionals are encouraged to see how the testing device works so that they can pass this information to their patients or clients. The program targets health care providers, such as nurses, doctors and dentists, who can incorporate radon testing as a risk factor when counseling patients. While the response rate for the return of the test kits has been high -- between 50 and 75 percent, according to officials -- it is not known whether the health professionals are incorporating radon information in their patient checkups. The Radon Program has also contacted other professionals, such as real estate professionals and architects.

The Department of Health has also established a cooperative partnership with the Community College of Vermont, which has a continuing education program for real estate professionals. Through support from the Department, the College integrated radon awareness into a four-hour continuing education course delivered in 1996-97 to real estate professionals on a state-wide basis. State officials estimate that 300-400 professionals participated in the course.

Intra-Agency Collaboration and Support. The Radon Program works with the following Divisions within the Department of Health, which carry out certain radon-related activities:

- Division of Community Public Health -- provides referrals to the Radon Program and participates with the Program in public forums such as Head Start Health Fairs.

- Division of Health Surveillance -- provides consultation and advice on data interpretation and participates in the "Vermont Centers for Disease Control Behavioral Risk Factors Survey (Module 5: Radon Testing)."

- Division of Health Protection-- provides local distribution of radon information through its Asbestos and Lead programs field staff and makes referrals through its Toxicology and Risk Assessment Program and Private Drinking Water Supply Program.

- Vermont Health Department Laboratory -- provides technical support, such as radon measurement services for air and water, upon request. Over 250 evaluations were conducted in fiscal year 1996-97.

III. DEPARTMENT OF LABOR AND INDUSTRY

According to the agency, the Department of Labor and Industry (L&I) was created in 1912 to "provide for the safety and protection of Vermont employees and employers and the general public through regulation, administration of licensing programs, consultant services, and training and education." The Department administers programs relating to safety in public buildings and workplaces, including licensing, inspection and workers' compensation programs. The Department employs approximately 77 people, located in the capital and three field offices.

Occupational Safety and Health. The Vermont Occupational Safety and Health Administration has jurisdiction over the private employee/employer relationship and exercises ultimate responsibility over occupational safety and health issues. As noted earlier, VOSHA consists of operating units from two agencies. The Department of Labor and Industry provides overall administration, management and enforcement of the program, and performs safety compliance inspection, consultation and training functions. The Department of Health performs health compliance inspections, consultations and training functions. In addition, the Department of Health's Office of Environmental Health responds to employee IAQ complaints that do not involve violation of VOSHA standards. VOSHA is responsible for adopting the state's health standards for the workplace, which are based on federal OSHA standards.

Building Codes. The Department of Labor and Industry is authorized by state law to adopt rules governing the construction of public buildings and the maintenance and operation of premises. V.S.A., Title 21 §252. The law defines "public building" broadly to include nearly all buildings other than single family homes -- state owned or leased facilities, public utilities, hospitals, schools, places of worship, homes for the aged and convalescents, nurseries and day care centers, buildings in which two or more persons are employed, residential rental properties, condominiums and cooperatives, restaurants, retail stores and office buildings.

The Department has adopted rules that apply to construction, additions and alterations of such public buildings, as well as to structural conditions in existing buildings that are life threatening. The rules incorporate the BOCA Building Code (1987 edition and 1988 supplement) and various provisions of the BOCA Mechanical Code. Code of Vermont Rules, 24-080-002, §10. The agency may authorize a municipal

government to enforce the provisions of this code. Thus far, only one municipality (the city of Burlington) has been authorized to do so.

Vermont law authorizes municipal governments to adopt codes for the construction, maintenance and repair of buildings, provided that the regulations are consistent with the building code provisions adopted by the Department of Labor and Industry. V.S.A., Title 24 §3101.

IV. VERMONT DEPARTMENT OF BUILDINGS AND GENERAL SERVICES

A. Background

The Vermont Department of Buildings and General Services, formerly known as the Department of State Buildings, has jurisdiction over the operation and maintenance of 545 state-owned buildings and 70 state-leased buildings. DBGS thus has a managerial function with respect to IAQ issues. Separate Divisions cover procurement, public records, telecommunications and facilities, among others. The Facilities Division is responsible for addressing indoor air quality.

B. Facilities Division

1. Background

Jurisdiction. The Facilities Division is responsible for addressing a broad range of health and safety issues in the operation and maintenance of state buildings.

Personnel. The Facilities Division houses 27 employees, including a building engineer who serves as full-time IAQ Coordinator.

Financial Resources. The Division has an annual budget of $14 million.

2. Legislation, Regulations and Standards

State law authorizes the Department of Buildings and General Services to prepare plans and specifications for the construction and repair of state-owned buildings, and to determine the necessity of repairs and replacements to all state-owned buildings. DBGS is required to request written authorization for repairs from the head

of the agency with control of the building; special procedures are provided for urgent repairs. V.S.A. Title 29 §152.

For new construction, DBGS follows state regulations incorporating the BOCA Building and Mechanical Codes and ASHRAE ventilation standards.

3. Activities

The Department of Buildings and General Services has been instrumental in remediating some of the IAQ problems that have received media and public attention. According to state officials, the Department has a positive working relationship with the state employees' union on IAQ issues, with both management and union officials actively participating in the Safety and Health Maintenance Committee under the state's contract with state employees.

Prevention-oriented Practices. The Facilities Division has developed a list of environmentally-friendly products, such as fast-drying ink, low-VOC paints and adhesives, low-emission carpets, and fabric covers that are to be used in state building construction, renovation and maintenance. As noted earlier, the IAQC subcommittee on state buildings has been involved in this area by directing DBGS to change the type of paint being used in state buildings and looking at the use of certain cleaning materials.

DBGS has worked with the Department of Health's Radon Program to place radon monitors in some state-owned or leased buildings.

Training. The Division carries out an extensive training program, particularly for its building engineers and the 180 employees on its maintenance staff. Training includes sessions on HVAC maintenance, filter types, and the use of cleaning and refinishing chemicals.

Complaint Investigation. The Division's IAQ Coordinator responds to complaints on indoor air quality from state employees. The IAQ coordinator determines the nature of the problem through conversation or an on-site investigation. If the problem appears to have a mechanical or structural source, such as the ventilation system or ductwork, the Facilities Division attempts remediation. If the complaint appears to have a biological cause, then the IAQ coordinator refers the case to the Department of Health's

OEH for further investigation and recommendations. DBGS retains authority over building repairs that are necessary to address IAQ complaints.

V. VERMONT DEPARTMENT OF EDUCATION

The Department of Education (DOE) addresses IAQ in schools primarily through its representation on the IAQC on Schools and State Buildings, described earlier. There are 383 schools and 282 school districts in Vermont.

No legislation in Vermont specifically addresses indoor air quality issues in schools. State law directs the Department to

> provide an educational facilities planning service to make available technical assistance and comprehensive information on school construction, school systems design, component technology and supplies...for the purpose of helping ...schools to achieve flexibility and economy in construction, to retain the potential for modification and expansion of educational facilities, and to attain the lowest maintenance costs consistent with educational needs.

V.S.A. Title 16 §212.

Vermont law also requires the state Board of Education to adopt rules regarding school construction and capital outlays. V.S.A. Title 16 §3448(e). After a school district obtains approval from its voters for a new construction project, it applies to DOE for funding assistance. To qualify for the funding, the school district allows DOE to audit the process and agrees to abide by state Board of Education construction standards. These standards historically have included requirements that ventilation be provided consistent with the BOCA Mechanical Code. Code of Vermont Rules, 22-000-014 §6241.7.

The Vermont legislature has placed a moratorium on new school construction, following concerns about the high levels of funding required for those projects. The legislature has repealed the existing construction regulations and directed the Board of Education to develop new regulations. (The agency is still operating under existing regulations for already funded projects.) These regulations will include changes to the process for obtaining state construction aid. DOE officials are hoping that the IAQC on Schools and State Buildings will be able to recommend construction standards that address indoor air quality issues in time for the promulgation of new DOE regulations.

Indoor air quality issues in existing school buildings are not covered by state Board of Education regulations, except tangentially through the public school approval process. As part of this process, DOE inspects schools and grants "approval." The regulations governing this process, which are also being rewritten, require that a school has an "inviting school atmosphere" and is "free from disagreeable odors." A recently enacted state law also addresses school maintenance indirectly, by providing that construction aid is not available to a school if the need for the aid is due in part or whole to significant deferred maintenance.

According to agency officials, IAQ problems in existing schools have been addressed at the state level mainly by the Department of Health's OEH. Officials expect this arrangement to continue into the foreseeable future. Some Vermont school districts have had to deal with allegations of "sick building syndrome" and have used school district funds to hire private IAQ consultants.

VI. SUMMARY

The State of Vermont is currently re-evaluating its programs and policies relating to indoor air quality in state buildings and schools. This review, conducted by an interagency committee, has established a broad set of goals, including the development of IAQ standards and protocols. While state agencies have been increasingly active on IAQ issues since the formation of this Committee, these agencies are predominantly in an investigative mode with respect to indoor air quality. The role and functions of the agencies in this area are likely to evolve as the Committee continues its work and issues recommendations.

A. Structure and Focus of State IAQ Programs

Jurisdiction

The Department of Health's Office of Environmental Health has begun to take on a central role in indoor air quality, handling inquiries and providing information on most types of IAQ problems in state buildings, schools, workplaces and residences. The Department of Buildings and General Services continues to be the first point of contact for state employees' IAQ complaints, but depending on whether the problem is mechanical or biological, the DBGS either retains the case or refers the matter to

Department of Health. DBGS has responsibility over IAQ-related repairs to state buildings.

The Vermont Occupational Safety and Health Administration has regulatory authority over IAQ issues in the workplace. However, VOSHA determined over the last several years that IAQ complaints from office workers were not adequately addressed by the federal OSHA standards (incorporated into Vermont regulations) aimed at the industrial setting. Because those complaints were better served by the information provided by the Office of Environmental Health, VOSHA began referring private employee IAQ concerns to OEH.

The Department of Education has jurisdiction to establish construction standards for new schools, as well as to approve existing schools every ten years. Although the Department's role in IAQ issues has been limited in the past, this may change as attention within the IAQC continues to focus on schools.

Interagency Coordination

The Indoor Air Quality Committee on Schools and State Buildings is the central mechanism for interagency coordination and is serving as a vehicle for developing IAQ policies across state agencies. The IAQC is addressing how best to coordinate the efforts of different agencies on an ongoing basis by developing a response protocol for handling IAQ inquiries.

State agencies use an informal system of "triaging" IAQ complaints. The Department of Health in particular has occasion to work together with other agencies, given the fact that the Department has taken on IAQ responsibilities in areas that generally fall under the purview of other agencies -- for example, workplaces, schools and state buildings.

Activities

The work of the IAQC is the most notable among the indoor air quality initiatives currently being undertaken at the state level in Vermont. It is possible that the focus and scope of IAQ activities undertaken by state agencies will change as the committee completes its investigations and drafts its recommendations.

The Department of Health is the central point of contact for people who seek information about IAQ problems. The Office of Environmental Health responds to inquiries about a wide range of general IAQ problems in a variety of settings. The Office conducts limited investigations, and provides information or recommendations to assist in addressing individual problems. Among the information that is provided by the office is a listing of private IAQ professionals. The Department of Health's Radon Program also does extensive education and outreach (as well as radon testing), often in collaboration with non-governmental partners.

The Department of Buildings and General Services has a managerial function with respect to IAQ problems in state buildings. DBGS responds to complaints from state employees, investigates IAQ problems and seeks to resolve those problems. The agency carries out considerable training around these subjects, and has taken the proactive step of developing a list of environmentally-friendly products for use in construction, renovation and maintenance activities.

State-Local Relationships

In the absence of a county government structure, and in light of the small size of most municipalities in Vermont, virtually all program activity on indoor air quality issues is being done at the state government level, or by private testing companies and non-governmental organizations. Questions addressed to local governments on indoor air quality issues are generally referred to the Department of Health or Department of Buildings and General Services.

The state may delegate to a local government the authority to enforce the state's building code. Thus far, only the city of Burlington has been authorized to do so. Local governments have jurisdiction to adopt building codes for buildings that are not covered by the state code; those local codes must be consistent with the provisions of the state code.

B. Factors Influencing the Development and Implementation of Vermont's Programs

Vermont's Indoor Air Problems

Vermont's focus on indoor air quality issues in state buildings and schools has resulted in large measure from highly publicized cases in 1995 involving a state office

building and a high school, as well as from substantial concern over IAQ on the part of state employees.

Legislation, Regulation and Standards

Vermont's smoking law is the only state legislation directly addressing indoor air quality. In 1993, the legislature enacted one of the most stringent smoking laws in the country, prohibiting smoking in public places. This law complements a 1987 statute restricting smoking in workplaces. The workplace smoking law, which provides a mechanism for public complaints and enforcement by the Department of Health, accounts for between 10 and 30 percent of the time of the Department's IAQ staff person. The 1993 law did not provide explicitly for enforcement, nor did it provide funding for education or implementation by the Department of Health. Nevertheless, the Department has taken the initiative to conduct a public education campaign regarding the law, as well as to designate a staff person to receive complaints concerning the law. The Department has referred some cases to the Attorney General's office for enforcement.

Vermont has enacted a building code which incorporates BOCA Building and Mechanical Codes. The building code is applicable to most buildings other than single family homes.

The IAQC is expected to issue proposals for the adoption of standards or protocols on matters ranging from ventilation and maintenance to cleaning products and paints. The Department of Education and DBGS will play the key roles in developing standards for schools and state buildings, under the auspices of the IAQC subcommittees studying these issues. New standards could be incorporated into the Department of Education regulations on school construction and maintenance, which are being re-written in response to a recent judicial challenge to their constitutionality. Some changes in agency policies and activities have occurred already as a result of the work of the IAQC, such as changes in the type of paint used for state building projects.

State-Federal Relationships

Vermont has received EPA funding to support its Radon Program, and state officials indicate that the program is reliant on that funding to continue its current level of activities. The EPA will be stationing an IAQ specialist in Vermont for four years, and the Department of Health sees this as opportunity to improve its IAQ response activities.

EPA has also played a prominent role in the issue of indoor air quality in schools, primarily through its IAQ Tools for Schools materials and training courses for school officials. The Department of Health uses other EPA materials, such as the *Building Air Quality: A Guide for Building Owners and Facility Managers*, and various radon publications. The Department also uses EPA and NIOSH guidelines in conducting IAQ investigations of private workplaces.

In addition, EPA Region I has recently provided a grant to the non-governmental organization Vermont Public Interest Research Group (VPIRG) to undertake an IAQ Tools for Schools Outreach and Healthy Schools Initiative.

Stakeholder Participation

The state's Indoor Air Quality Committee was formed through an agreement between the Vermont State Employees' Association and the state administration, in order to address emerging issues relating to IAQ in the workplace. The IAQC subcommittees include representation from both the state employees' and teachers' unions, as well as public interest groups and private IAQ professionals.

According to state officials, the Department of Buildings and General Services has a positive working relationship with the Vermont State Employees' Association on IAQ issues; both management and union officials participate in the Safety and Health Maintenance Committee under the state contract with state employees.

Resources

Resource constraints play a considerable role in limiting the extent of IAQ activities in Vermont. Most general IAQ issues fall within the purview of a single staff person in the state's main IAQ program within the Office of Environmental Health. OEH does have additional staff and funding to address certain pollutants, including radon, lead and asbestos.

ENDNOTE

1. Smoking violations in the public schools are handled by the Enforcement Division of the Department of Liquor Control, although any law enforcement official may enforce the new state law prohibiting minors from possessing or purchasing tobacco products. The Vermont Department of Personnel facilitated the creation of worksite committees to handle smoking issues in each state building. Complaints from state employees are initially handled by the

worksite committee, but if there is no resolution, the cases are referred to the Department of Personnel.

Chapter Seven

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Montgomery County, Maryland

I. INTRODUCTION

A. Political and Demographic Features

Montgomery County is the most populous county in the state of Maryland and covers 495 square miles. The county is governed by a 1968 charter that provides for separate legislative and executive branches of government. Montgomery County's approximately 810,00 residents -- over 300,000 households -- live mainly in unincorporated areas, as well as in incorporated cities such as Rockville, Gaithersburg, and Takoma Park.

B. Geographic Features and Indoor Air Quality Issues

Montgomery County is designated as a Zone 1 (high radon potential) area. Indoor air program officials estimate that there is one radon-related death per week in Montgomery County, and thus view radon as one of the county's most significant indoor air problems. Indoor air program officials recently re-examined radon risk calculations and determined that radon is the largest single non-smoking air quality health risk to county residents. County officials also note the prevalence of transient problems involving VOCs and mold.

C. Political and Legislative Highlights

Montgomery County plays a significant role in indoor air quality issues, particularly in light of the termination of the Maryland Department of the Environment's general radon and IAQ programs in 1995. The state continues to address indoor air quality in schools through the Department of Education, which has taken an active role in this area. Within the Department of Licensing and Regulation, the Maryland Occupational Safety and Health (MOSH) office addresses IAQ in workplaces through its health and safety enforcement activities and consultative services for employers. The MOSH office responds to employee complaints under the state law restricting smoking in enclosed workplaces.

Montgomery County has been active on various indoor air issues for a number of years. This is particularly true for radon, and the county adopted mandatory radon-resistant new construction standards in 1990. Few, if any, other county governments in the nation have taken that step. For years, county regulations have established requirements for ventilation systems in new construction, and in 1997, the county adopted the new model International Mechanical Code. Although no other general indoor air quality legislation has been adopted, county officials are considering proposing a measure to provide broad authority for the county's indoor air quality activities.

The Energy Conservation and Air Quality Committee (ECAQC) is one of numerous formal advisory committees appointed by the county Executive and confirmed by the county Council. The ECAQC was originally set up to advise the county Executive, Council and agencies on energy conservation matters; air quality (indoor and outdoor) was added to the Committee's responsibilities about three years ago. The composition of the 15-member Committee reflects the original focus on energy, though stakeholders on indoor air issues have also been appointed recently.

A recent development in Montgomery County is the formation of a Process Action Team, which includes Montgomery County Public Schools officials, as well as the county's central IAQ program and Chief Medical Officer. This interagency group is developing a report describing current IAQ practices and problem areas in the county school system. The report, which is expected in November, 1997, will also include recommendations for addressing IAQ issues.

D. Overview of County Governmental Structure for Addressing IAQ Issues

Montgomery County's principal indoor air program is located with the county's Department of Environmental Protection. In addition, the county's school system has been active for a number of years in addressing IAQ issues in public schools. Other agencies with indoor air responsibilities include the Department of Permitting Services (new construction permits); the Department of Finance (IAQ in the workplace); and the Department of Facilities and Services (IAQ in county buildings). The Department of Health has limited involvement with IAQ issues through its environmental tobacco smoke education activities, as well as through its consultation with other agencies on cases involving IAQ-related public health / medical impacts.

There is no formal delineation of jurisdiction over IAQ issues, and interagency coordination takes place on a case-by-case basis. County officials refer cases to one another as appropriate. Agencies sometimes work together on cases.

II. DEPARTMENT OF ENVIRONMENTAL PROTECTION

A. Background

Montgomery County has a separate environmental agency, the Department of Environmental Protection (DEP). DEP is responsible for implementing various environmental programs and enforcing the county's environmental legislation. Within DEP, indoor air quality issues are addressed by the Office of Environmental Policy and Compliance.

B. Office of Environmental Policy and Compliance

1. Background

The Office of Environmental Policy and Compliance (OEPC) is comprised of several programs that parallel the principal areas covered by DEP -- water quality, air quality, noise, waste, energy, and emergency response. Indoor air is addressed by OEPC's air quality section, which also is responsible for ambient air pollution issues.

Creation. OEPC's air quality section has been increasingly active in indoor air quality issues over the past few years. During that time, the indoor air program has re-evaluated and reorganized its activities. The activities described below have been initiated primarily during this period.

Jurisdiction. OEPC's activities cover a broad range of indoor air pollutants, particularly radon, volatile organic compounds, biological contaminants, carbon monoxide and asbestos. The office does not currently address lead or environmental tobacco smoke. Lead and environmental tobacco smoke are addressed by programs within the county's Department of Health and Human Services.

OEPC recently undertook a radon risk assessment using new residential radon data and concluded that radon is the single greatest air quality health risk in the county, excluding environmental tobacco smoke. This risk analysis led the office to increase its radon related activities, as described below.

OEPC's work is not limited to particular types of buildings, although certain activities focus more heavily on certain buildings. For example, carbon monoxide and radon outreach focus on residences, while efforts to address biological and VOC contamination cover both multi-family residential and commercial buildings. The office does not have primary jurisdiction over IAQ in schools or county buildings, but sometimes works with other governmental offices in addressing indoor air problems in those facilities.

Personnel Resources. The air quality section of OEPC is staffed by a program manager and one assistant. Other staff in OEPC work with the indoor air quality program and other OEPC programs: two office managers, one telephone intake staff person and four multi-media field investigators.

Financial Resources. Funding for air quality section staffing and operating costs comes from the general OEPC budget. OEPC is a line item in the Department of Environmental Protection budget, and its funding is derived from two sources: general state tax revenues, and a special solid waste disposal fund. This fund supports solid waste-related activities throughout the agency; it plays a fairly limited role in supporting the activities of the air quality section. OEPC funding for the last fiscal year was approximately $618,480 from general funds, and over $647,000 from the solid waste disposal fund.

OEPC has applied for radon (SIRG) funding from EPA. Although SIRG grants have only been made to states in the past, the county is seeking to be one of the first local governments to receive the grant directly from EPA, in light of the fact that Maryland no longer has a state radon program. OEPC's indoor air program received a mini-grant from the International City / County Management Association (ICMA) for radon outreach work in 1996.

2. Legislation, Regulations and Standards

The principal legal authority for the activities undertaken by OEPC's air quality section is Montgomery County Code, Chapter 3, which covers air quality. The code addresses mainly ambient air issues. However, the code defines "nuisance" broadly as "environmental conditions...prejudicial to reasonable enjoyment of health, comfort or safety of any individual or causing injury or damage to persons, property or the conduct of business," and authorizes DEP to issue abatement orders against the responsible party in limited circumstances.

According to agency officials, OEPC is currently developing a legislative proposal that would amend the code to provide DEP with explicit authority over indoor air quality issues. Such a proposal would likely give the office authority to inform, mediate and resolve IAQ problems, as well as to take action in an emergency situation.

OEPC officials also indicate that the office will be working with the Department of Permitting Services (see Section IV, below) to implement a provision of the county's recently adopted building code. Section 401.9 of the 1996 International Mechanical Code (as adopted by Montgomery County Executive Regulation 3-97) requires that

> stationary local sources producing air-borne particulates, heat, odors, fumes, spray, vapors or gases in such quantities as to be irritating or injurious to health shall be provided with an exhaust system . . . . or a means of collection and removal of the contaminants.

The exhaust system required must discharge "directly to an approved location at the exterior of the building . . . in accordance with applicable state and county laws and regulations."

OEPC expects to work with the Department of Permitting Services to ensure that building permit applicants comply with this provision by designing exhaust systems that will not adversely impact indoor air quality in the new building or in nearby buildings.

3. Activities

OEPC's indoor air work centers on responding to telephone calls from the public requesting information or assistance in addressing an IAQ concern. In addition, the program seeks to take a proactive approach to indoor air issues through public education. The principal contact between OEPC and the state government on IAQ issues is through referrals of IAQ problems from state agencies, which no longer handle indoor air issues.

Technical Assistance/Consultation. The principal activity of the indoor air program is providing advice and technical assistance in response to requests for assistance on a site-specific IAQ problem. The program has provided assistance to other governmental agencies, such as the school system, as well as commercial and residential property.

The program takes a holistic, problem-solving approach toward helping residents address indoor air quality issues. Telephone requests span a broad range of subjects including VOCs (e.g., transient solvent exposures) and biological contaminants (e.g., moisture-induced mold growth) and cover a wide variety of circumstances. According to officials, many calls to the program involve IAQ-related disputes between adjoining commercial tenants (e.g., incompatible land uses) or neighboring residents within a building.

The goal of OEPC's technical assistance and consultation activities is to facilitate the resolution of IAQ problems by helping people identify the problem and determine an appropriate technical solution. OEPC does not undertake mitigation or remediation in buildings, nor does it have authority generally to order parties to correct a problem. One exception to this rule is an indoor air quality problem caused by a regulated activity such as a neighboring facility's ambient air emissions.

OEPC receives about 2-3 requests for assistance per day and maintains a daily log of those requests. When the program receives a call relating to indoor air, an OEPC staff person fields the call and either provides basic information or refers the call to the air quality program staff for further assistance. If a request for assistance cannot be resolved over the telephone an investigator from OEPC may make a site visit to diagnose the problem and help the building owner or manager identify a technical solution. The program generally does not conduct investigations involving single family residential dwellings, but does maintain a list of private IAQ consultants.

OEPC staff only enter premises by invitation. Investigations generally involve visual and sensory inspections, as well as the use of tools such as smoke tubes, photoionization detectors or Sensedyne tubes. Although OEPC has limited sampling capability, if the program believes that additional testing is warranted it may refer people to private firms. The county is divided up into four regions for purposes of investigations; each investigator covers one region. The indoor air program manager conducts certain investigations as well.

The indoor air program receives numerous calls that potentially involve site visits. The program generally investigates a problem only if it appears to pose a public health threat, and considers certain factors in determining when to pursue a case, including: (1) the number of people affected by the problem; (2) the severity and frequency of the contamination; and (3) the extent to which the county can help resolve the problem. The program is currently seeking to a more formal approach for determining which cases to investigate.

Public Information, Education and Outreach. OEPC has developed information kits to distribute to people who request information. These kits include information about IAQ, radon and carbon monoxide. The indoor air program receives about one request per day for such information, and has kept a log of those requests since October, 1996.

OEPC has been involved in an interagency effort to increase public awareness of carbon monoxide poisoning, in which the agency worked primarily with the Fire and Rescue Services and with the Library System. As part of this effort, the indoor air program developed a brochure on carbon monoxide.

Radon outreach has been a larger part of OEPC's efforts over the past couple of years, and in 1996, the indoor air program received a mini-grant from ICMA for radon outreach. The program has developed a radon brochure, which it is now revising. In addition to printed information, OEPC has created television and radio spots on radon. The program also maintains a list of radon testers, mitigators, and laboratories, which will be provided upon request.

Indoor air program staff also make presentations to interested parties and members of the public. The program recently obtained a model house which it uses to demonstrate ventilation systems and the movement of indoor air contaminants within a home.

III. MONTGOMERY COUNTY PUBLIC SCHOOLS

A. Background

The Maryland Department of Education has maintained its focus on IAQ issues, even as other state IAQ programs have ended. In order to increase the capacity of individual school districts to identify and resolve IAQ problems at the local level, the Department provides support, training and education on IAQ issues to the state's 24 independent school systems. The Department has held IAQ seminars for local school officials, developed numerous technical guidance documents, and provided advice and consultation to local officials. The Department also plays an active role in reviewing school construction plans; the state has authority to review and approve any construction or renovation project that involves state funding or that costs more than $350,000.

Montgomery County is among the four largest of Maryland's 24 schools districts and is active on IAQ issues. The Montgomery County Public Schools (MCPS) system is

governed by a Board of Education and functions independently of the Montgomery County Executive. Thus, it is the Board of Education, not the county government, that controls school buildings. Within the MCPS system, the Department of Facilities Management is responsible for addressing IAQ issues. A Safety and Environmental Health Unit (SEHU) works alongside the director of the Department and four other divisions in the Department: maintenance, school plant operations, construction and security. SEHU is the focus of this section because it serves investigative and coordinating functions within the Department.

B. Safety and Environmental Health Unit

1. Background

Creation. The Safety and Environmental Health Unit first addressed indoor air issues in the mid-late 1980's. Initially, the Unit worked with the county's Department of Environmental Protection to gain a better understanding of how to conduct IAQ inspections of school buildings. Following this period of joint activity, the Unit initiated and implemented the activities described below.

Jurisdiction. MCPS has jurisdiction over more than 200 facilities, 187 of which are schools. SEHU addresses all aspects of indoor air quality.

Personnel. Four staff members work within SEHU: one supervisor, one environmental safety specialist, one occupational safety specialist and one secretary. Indoor air quality issues are among many issues addressed by the Unit. Additional staff within the maintenance, operations and construction divisions perform IAQ-related work at individual schools.

Financial Resources. The MCPS budget funds salaries for staff members who address indoor air quality, among other issues. There is no separate allocation for indoor air quality issues.

2. Activities

Investigations. In the late 1980's, SEHU became involved with indoor air quality by working with two unions representing teachers and support services staff. This collaboration led to the creation of two written forms for use during investigations of IAQ complaints within the school system. An "inquiry form" records an individual's question or inquiry; one copy of the form is sent to the union and one copy to SEHU. A

"building services investigation report" form is completed by the school's building services manager following the initial investigation into an individual inquiry. SEHU investigations take place following this initial investigation.

SEHU officials estimate they have conducted over 530 on-site investigations during the past two fiscal years. Investigations generally involve temperature, humidity and carbon dioxide measurements and interviews with school personnel and others. SEHU makes recommendations to the Department of Facilities Management, suggesting steps to correct the problem. The Department director then sends a report to the school principal describing the problem and outlining the steps needed to resolve the problem. SEHU coordinates with the Department's Operations and Plant Management Divisions, as well as with school personnel, during resolution of the problem.

MCPS system officials note that they seek to maintain a good networking relationship with county agencies, and they sometimes work with other agencies on specific indoor air problems. This is particularly the case with the county Department of Health. For example, SEHU forwards its IAQ investigation and recommendation forms to the Department of Health when a medical opinion is needed. SEHU is now adapting a medical form to use as an attachment to the IAQ Inquiry Form, in order to expedite attention to health issues. In addition, the Health Department has undertaken an epidemiological study to address the school system's concern over a high rate of sickness among students and employees and allegations of multiple chemical sensitivities. SEHU also worked with the Departments of Health and Environmental Protection to address serious mold problems causes by excessive heat and humidity. As part of this effort, the school system purchased high efficiency particulate arrestance (HEPA) vacuums to prevent or clean up future problems.

Preventive Maintenance. Among the preventive maintenance practices cited by school officials are comprehensive summer cleaning regimens and schedules for changing filters in ventilation systems. In schools with chemically sensitive people, the school system provides prior notification to school personnel before undertaking painting or certain other types of maintenance work. Officials also note that the school system has promoted and implemented integrated pest management in schools for a number of years.

Education and Training. SEHU keeps schools informed about the activities of the Unit in the area of indoor air quality mainly through making presentations and attending meetings at schools upon request. During school safety month in September

of each year, the MCPS system sends a memo to principals and school safety directors with information on a broad range of subjects, including IAQ. At around this time, the agency also holds meetings with principals. SEHU conducts IAQ training for staff in the Maintenance and Plant Operations Divisions.

New Construction Review. SEHU participates, along with the Division of Construction, in the review of new school building plans. According to officials, the Department uses ASHRAE standards as guidance in reviewing plans, in addition to the MCPS system's lengthy set of general specifications for building design and construction.

IV. DEPARTMENT OF PERMITTING SERVICES

A. Background

The Montgomery County government was reorganized recently to place all permitting within one agency, the Department of Permitting Services (DPS). The adoption and enforcement of construction codes and the issuance of permits for new construction is now carried out by DPS, mainly through its Division of Building Construction Services.

B. Division of Building Construction Services - Field Services Section / Commercial Buildings

1. Background

Origin. With the agency reorganization, the county's commercial building permitting activities moved from the Department of Environmental Protection to DPS.

Jurisdiction. The indoor air quality responsibilities of the Field Services Section / Commercial Buildings office extends primarily to the air handling systems of commercial buildings. This includes, but is not limited to, problems relating to ventilation air, exhaust systems, ducting, chimneys and vents.

Personnel. The Field Services Section / Commercial Buildings office is comprised of seven staff persons, including one field supervisor, four inspectors and two engineers.

2. Legislation, Regulations and Standards

In 1997, Montgomery County adopted the 1996 BOCA International Mechanical Code (IMC), replacing the previous edition of the BOCA National Mechanical Code.[1] Montgomery County Executive Regulation 3-97. Chapter Four of the International Mechanical Code establishes minimum requirements for outdoor air intake, based on occupancy type and load. The code applies to all buildings except detached one and two family houses and single family townhouses.

3. Activities

Issuing construction permits for commercial buildings and ensuring compliance with permits are the primary activities of the Field Services Section / Commercial Buildings staff. The office issues a building permit, and then conducts an inspection to ensure compliance with the permit. The inspection occurs after installation of systems, but before the wall board and ceiling membrane are put in. Although the agency has authority to review building plans for compliance with the county's mechanical code, officials note that the agency has insufficient staff resources for such review, and the review of mechanical systems takes place in the field. If a field inspection reveals a violation of the permit conditions the agency can require the permit holder to correct the condition, and can initiate enforcement procedures if the violation persists.

Once the permit is finalized and a mechanical system becomes an active part of the building the agency's role is essentially over. Complaints about permitted commercial buildings are handled by the DPS zoning division, which makes referrals to the Field Services Section / Commercial Buildings staff or to other county agencies (e.g., DEP). Division officials note that mechanical problems account for the fewest complaints received by DPS. The agency is most likely to take action with respect to a permitted building if the building presents a threat to health or safety. For example, if an air handling system in a building fails repeatedly, DPS' Field Services Section / Commercial Buildings staff can investigate and order repairs. In general, the office can require that a system operate in accordance with the standards in effect when the system was permitted and installed.

C. Division of Building Construction Services - Field Services Section / Residential Buildings

DPS, through its Field Services Section / Residential Buildings office, is responsible for issuing construction permits for residential buildings and ensuring

compliance with the permits. With respect to IAQ-related requirements, the county has taken the unusual step of adopting mandatory radon-resistant construction standards. Those standards were first adopted in 1990, and revised in 1995 and 1997. The current county regulation adopts and amends the CABO 1995 One and Two Family Dwelling Code, including its radon control features. Montgomery County Executive Regulation 4-97. The CABO code (§303-95) as adopted by Montgomery County also incorporates minimum ventilation requirements. The code applies to all detached one and two family homes and single family townhouses.

V. OTHER AGENCIES

A. Department of Finance, Division of Risk Management

Montgomery County Government manages its own workers' compensation system for county employees through the Department of Finance's Division of Risk Management. Within the Division of Risk Management is a Health and Safety Section, which employs three people who are responsible for investigating county workers' health and safety complaints. These investigations are independent of insurance claims investigations performed in relation to individual workers' compensation claims. The office's focus on indoor air quality issues is fairly recent, with the hiring of a certified industrial hygienist to address those complaints.

The workplace regulations in effect in Montgomery County Government are those adopted by the Maryland Occupational Safety and Health (MOSH) office. According to Health and Safety staff, there are no workplace requirements that adequately address indoor air quality or ventilation. The staff uses ASHRAE standards as guidelines during their investigations, as well as NIOSH and other model practices. Where a complaint about a county building originates from a non-employee -- e.g., a member of the public using a county library -- the office coordinates with the DEP's Office of Environmental Policy and Compliance to investigate the problem.

During the course of an investigation, the Health and Safety Section will seek to identify any factors that may be contributing to an IAQ-related complaint and work to resolve the problem. For example, if the office determines that an isolated event or activity is affecting indoor air quality, staff may attempt to stop the activity, alter the pollutant pathways or ventilate the affected area. In some cases, affected employees may be temporarily relocated. The Health and Safety Section works with the county's Department of Facilities and Services, which is responsible for repair and maintenance of county buildings.

B. Department of Health and Human Services

In addition to housing the county's childhood lead poisoning prevention program, the Department of Health and Human Services (DHHS) is involved with indoor air quality issues in two main ways. First, the agency provides input on IAQ-related health and medical impacts in particular cases or situations. For example, DHHS works with the county school district to address cases involving school occupants.

Second, DHHS undertakes educational activities relating to environmental tobacco smoke. These activities include public presentations and distribution of materials that emphasize the dangers of environmental tobacco smoke. DHHS has also worked with other governmental and non-governmental parties to conduct a survey of smoke-free restaurants in the county and to develop a smoke-free dining guide. DHHS has distributed information on Maryland's smoking law, which is implemented and enforced at the state level. The county has established a no-smoking policy in county-owned and leased buildings, and there have been county legislative proposals to ban smoking in certain other public places.

C. Division of Facilities and Services

The Division of Facilities and Services is responsible for maintenance and repairs to county-owned buildings. The Division has also adopted Montgomery County Energy Design Guidelines, which apply to all buildings constructed with county funds. The requirements contained in the Guidelines supplement the county building code requirements. The Guidelines contain filtration requirements and minimum ventilation requirements consistent with ASHRAE 62-1989.

D. Department of Housing and Community Affairs

The Department of Housing and Community Affairs is responsible for licensing residential rental properties and for enforcing the county's residential housing code. That code is contained in Montgomery County Code, Chapter 26 -- Housing and Building Maintenance Standards. The code includes a requirement that all habitable rooms provide ventilation in accordance with the minimum standards contained in the county's building codes. The code further specifies the minimum openable window or door area for each room. The Department is responsible for enforcement of this provision, though ventilation does not appear to be a prominent part of the agency's code enforcement activities.

VI. OBSERVATIONS

A. Structure and Focus of State IAQ Programs

Jurisdiction

Montgomery County's principal indoor air program is housed in the Department of Environmental Protection's Office of Environmental Policy and Compliance. DEP / OEPC addresses indoor air issues as part of its general authority over air quality. The office covers most types of IAQ issues (except environmental tobacco smoke and lead) in residential and private commercial buildings.

The Montgomery County Public Schools system is the central body responsible for IAQ in county schools. The school system is independent of the county government and actively addresses indoor air problems as part of its general authority over health and safety issues.

Other county agencies address indoor air quality in a limited fashion, including:

- The Department of Permitting Services -- new construction standards and permits;
- The Department of Finance -- workplace health and safety;
- The Department of Facilities and Services -- county-owned and leased buildings; and
- The Department of Health -- public health / medical impacts of IAQ problems.

Interagency Coordination

Informal interagency coordination on indoor air issues is practiced within Montgomery County. As the central indoor air quality program, the DEP / OEPC works with other agencies on particular cases. For example, both DEP / OEPC and the Department of Finance (Division of Risk Management) might jointly investigate IAQ complaints in a public library, where both the public and county employees could be affected. DEP / OEPC also receives referrals in a variety of cases that fall outside the jurisdiction of other agencies. As noted above, the school district has worked with DEP / OEPC in the past, and works with the Department of Health and Human Services on medical issues. A more formal vehicle for interagency collaboration was recently initiated. DEP / OEPC , the Montgomery County Public Schools system and the county's Chief Medical Officer worked together to form a Process Action Team which will develop guidance on identifying and addressing IAQ problems in schools.

Activities

The DEP / OEPC indoor air program emphasizes investigation and technical assistance in response to inquiries from the public. It works to help county residents find solutions to the broad array of indoor air quality-related issues and concerns. The office regularly fields calls concerning residences as well as commercial buildings and seeks to assist building owners, managers and residents in addressing their indoor air problems. Program staff conduct field investigations in many cases, but enter buildings only at the invitation of owners and residents. While DEP / OEPC staff do not have authority to require repairs, they do encourage resolution of IAQ problems, often working with multiple parties affected by the problem. The office does not undertake remediation or mitigation, though staff offer suggestions as to possible technical solutions to IAQ problems.

The Montgomery County Public Schools system also responds to IAQ complaints, and has developed a formal system for processing such complaints. The school system is responsible for undertaking IAQ-related repairs, as well as performing routine maintenance relating to indoor air quality.

Complaint investigation and technical assistance is also provided in a more limited fashion by the Department of Finance (Division of Risk Management) in response to complaints by county workers. The Division of Risk Management is not responsible for making repairs to county buildings, such as repairs to ventilation systems. That function is the responsibility of the County's Department of Facilities and Services, which does not appear to have a programmatic focus on indoor air quality issues.

The DEP / OEPC indoor air program, as well as the school system, carries out educational activities in addition to providing technical assistance. DEP / OEPC develops and distributes brochures on various indoor air subjects and makes presentations at the request of county groups. The school system provides information and training to school system staff and to principals and other staff at schools throughout the county.

State-Local Relationships

In general, there is greater interaction on IAQ issues among county offices than there is between the county and the state. Montgomery County's general indoor air

program has become increasingly active at about the same time that the state's formal role in this field has ended. Outside of referrals to the county, there is relatively little contact between the county and state on general IAQ issues.

With respect to IAQ in schools, the state Department of Education continues to have an active program. That program focuses on providing support to school systems throughout the state. Since the Montgomery County Public Schools system has had an active health and safety program for years, however, there is less of a need for technical assistance and support from the state. Although the county's Department of Finance (Division of Risk Management) refers workplace health and safety cases to the state for enforcement, those cases do not generally involve IAQ problems.

B. Factors Influencing the Development and Implementation of Montgomery County's Programs

Montgomery County's Indoor Air Problems

Montgomery County's IAQ programs were not initiated in response to highly publicized problems or events, but rather in response to county officials' general concern over the potential impacts of IAQ problems in the county's many residences, private commercial properties, county buildings and schools. County officials note that indoor air quality issues often receive more public attention than ambient air quality issues in Montgomery County. Indeed, governmental activities in this area (mainly complaint investigation and technical assistance) are driven by residents and employees concerns over IAQ problems and their health effects. In recent years, specific IAQ programs have focused on the problems of radon and carbon monoxide, as well as biological contaminants such as mold.

Legislation, Regulation and Standards

Building codes and standards is the only area in which IAQ-related legislation or regulation has played a significant role in Montgomery County. The county has taken the proactive step of adopting a regulation incorporating radon-resistant building standards for residential construction. The county also recently adopted regulations incorporating the 1996 International Mechanical Code, which contains ventilation requirements for commercial and multi-family residential buildings. The county's Department of Permitting Services enforces the Codes through its permitting process, which involves inspection of buildings after the building's mechanical and other systems are installed.

The county also has adopted a Housing and Building Maintenance Standards code, which governs existing buildings. The code prohibits unsafe, unhealthful or dangerous conditions. The code also requires that buildings meet the minimum ventilation standards provided in the county building code. The Department of Housing and Community Development has authority to enforce the code.

DEP / OEPC is currently developing a proposal to revise the county's air quality code to provide explicit authority in the area of indoor air quality.

County-Federal Relationships

There is relatively little direct contact between county offices and federal agencies on indoor air issues. DEP / OEPC is seeking to become one of the first county government agencies to receive a grant under EPA's state radon grant program.

Stakeholder Participation

Public interest in and concern over IAQ issues has been an important factor in the development of program activities within Montgomery County. Local officials working on IAQ issues are in regular contact with the public through their work responding to IAQ inquiries and complaints. The county indoor air program works closely with private consultants, as well as building owners and managers, in facilitating the resolution of indoor air problems.

Non-governmental organizations have played a key role in the area of IAQ in schools. The school system has worked closely with unions representing teachers and support staff to develop protocols for responding to IAQ inquiries. The Energy Conservation and Air Quality Committee (ECAQC), which advises the county goverment on energy and air quality issues, is also a vehicle for stakeholder participation in the county's indoor air quality programs. The 15-member Committee currently includes county residents who are IAQ technical professionals.

Resources

Montgomery County has a large, relatively affluent population and an active county government. County funds have been critical in enabling programs to hire staff with the requisite background and experience to provide technical assistance and advice on indoor air problems. This is true particularly in the case of the DEP / OEPC indoor air program and also the Department of Finance (Division of Risk Management),

which recently hired a staff person with expertise in indoor air quality issues. Similarly, the Montgomery County Public Schools system is large and funds a staff person who is responsible for health and safety issues, including indoor air quality.

Although the county's considerable resources have enabled county government and the school system to carry out activities related to indoor air quality, funding constraints do affect those programs. Given the large population and number of schools and other buildings in the county, offices must prioritize issues and limit some of their proactive projects, including training and education. The lack of funds allocated specifically for IAQ activities also results in few expenditures for equipment and other program needs.

ENDNOTE

1. The State of Maryland requires local jurisdictions to adopt the BOCA Code, though local jurisdictions may amend the code. COMAR § 5.02.07 (Building Performance Standards).

Appendix A

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Agencies with Indoor Air Quality Functions

This table lists agencies with IAQ-related functions in each jurisdiction surveyed. The table includes the following agencies:

- health;
- environment;
- education;
- labor;
- government buildings; and
- building codes.

For some jurisdictions, the table includes other agencies that have been active on IAQ issues.

Appendix A-1

Agencies with Indoor Air Quality Functions:
CALIFORNIA

AGENCY	OFFICE	DESCRIPTION
DEPARTMENT OF HEALTH SERVICES	• Environmental Health Laboratory Branch -- Indoor Air Quality Section	• Central IAQ program for state. Conducts and coordinates research on IAQ programs, provides IAQ information, and chairs state interagency IAQ Working Group.
	• Environmental Health Investigations Branch	• Provides information and training on chemical and microbial exposures indoors.
	• Environmental Management Branch -- Radon Program	• Carries out education and other radon-related activities.
	• Occupational Health Branch -- Hazard Evaluation System & Information Service	• Provides research and information on chemical air pollutants and infectious organisms that affect IAQ in the workplace.
	• Occupational Health Branch -- Occupational Health Surveillance & Evaluation Program	• Conducts research on occupational health issues.
	• Cancer Control Branch -- Tobacco Control Section	• Conducts public education and supports local efforts to reduce exposure to environmental tobacco smoke.
CALIFORNIA AIR RESOURCES BOARD	• Indoor Air Quality & Personal Exposure Assessment Program	• Conducts extensive research and disseminates information on indoor exposure to pollutants.
OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT	• Indoor Air Risk Assessment Group	• Develops guidelines and provides advice on assessment of health risks from indoor exposure to chemicals.
DEPARTMENT OF INDUSTRIAL RELATIONS	• Division of Occupational Safety & Health	• Enforces state health and safety requirements for public and private workplaces.
CALIFORNIA ENERGY RESOURCES CONSERVATION & DEVELOPMENT COMMISSION	• Division of Facilities Siting & Environmental Protection	• Develops energy efficiency standards for new construction and evaluates impact of standards on IAQ.
DEPARTMENT OF GENERAL SERVICES	• Building & Property Management Branch	• Oversees design, operation and maintenance of state facilities.
	• Professional Services Branch	

Appendix A-1

Agencies with Indoor Air Quality Functions:
CALIFORNIA (cont'd)

AGENCY	OFFICE	DESCRIPTION
DEPARTMENT OF EDUCATION		• Carries out programs in the areas of educational policy, curriculum, finance and accountability.
DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT		• Adopts rules governing construction, use, maintenance and occupancy of residential properties, which are subject to local adoption and enforcement.
DEPARTMENT OF PESTICIDE REGULATIONS		• Registers pesticides, promotes alternative pest management systems, and carries out pesticide exposure assessments.
DEPARTMENT OF CONSUMER AFFAIRS		• Enforces law requiring notice to building owners / tenants before pesticide application. Regulates the furniture, bedding and insulation industries in the state, primarily with respect to labeling, components, safety and flammability.

Appendix A-2

Agencies with Indoor Air Quality Functions:

FLORIDA

AGENCY	OFFICE	DESCRIPTION
DEPARTMENT OF HEALTH	• Bureau of Environmental Toxicology -- Radon and Indoor Air Office	• Central IAQ program for state. Provides technical assistance and information on general IAQ issues. Implements a variety of radon-related activities. Enforces state smoking law.
DEPARTMENT OF LABOR & EMPLOYMENT SECURITY	• Division of Safety	• Enforces state health and safety requirements for public workplaces and provides consultation services for private employers.
DEPARTMENT OF EDUCATION	• Bureau of Educational Facilities	• Provides IAQ training and technical assistance to school districts and community colleges.
DEPARTMENT OF MANAGEMENT SERVICES	• Division of Facilities Management -- Bureau of Maintenance • Division of Building Construction	• Oversees operation and maintenance of state-owned and leased building, and provides assistance to on-site building mangers. • Oversees design and construction of state buildings.
DEPARTMENT OF COMMUNITY AFFAIRS	• Office of Building Codes & Standards	• Identifies and updates versions of model building codes for adoption and enforcement by local governments.
DEPARTMENT OF ENVIRONMENTAL PROTECTION	• Division of Air Resources Management	• Provides IAQ information and makes referrals to other agencies.
DEPARTMENT OF AGRICULTURE	• Bureau of Entomology & Pest Control	• Regulates pesticide applicators and enforces requirements relating to pesticide applications.
DEPARTMENT OF BUSINESS & PROFESSIONAL REGULATION	• Professional Regulation Section	• Issues licenses for about 30 professions and inspects related places of business.

Appendix A-3

Agencies with Indoor Air Quality Functions:

MINNESOTA

AGENCY	OFFICE	DESCRIPTION
DEPARTMENT OF HEALTH	• Indoor Air & Lead Unit	• Central IAQ office for the state. Carries out enforcement, conducts research, provides information and supports local governments on IAQ issues.
DEPARTMENT OF CHILDREN, FAMILIES & LEARNING	• Capital Expenditure: Health & Safety Fund	• Provides funding to local school districts for health and safety projects, along with information and technical assistance.
DEPARTMENT OF AGRICULTURE	• Division of Agronomy & Plant Protection	• Enforces regulations governing pesticide applicators and pesticide applications.
DEPARTMENT OF PUBLIC SERVICE	• Energy Division	• Adopts Energy Code, which is part of state Building Code.
DEPARTMENT OF ADMINISTRATION	• Division of Building Codes & Standards	• Adopts state Building Code and coordinates training and information projects regarding the code.
DEPARTMENT OF EMPLOYEE RELATIONS	• Safety & Industrial Hygiene Unit	• Provides information and assistance in response to state agency questions and complaints about health and safety issues.
DEPARTMENT OF LABOR & INDUSTRY	• OSHA Health Section	• Enforces state occupational health and safety requirements in public and private workplaces.
POLLUTION CONTROL AGENCY		• Responds to complaints and inquiries about outdoor pollution that may affect indoor air.

Appendix A-4

Agencies with Indoor Air Quality Functions:
VERMONT

AGENCY	OFFICE	DESCRIPTION
DEPARTMENT OF HEALTH	• Office of Environmental Health • Office of Occupational & Radiological Health	• Central IAQ program for state. Provides information and assistance on IAQ issues and enforces state smoking law. • Carries out educational and other activities on the subject of radon. Enforces state's occupational health requirements.
DEPARTMENT OF LABOR & INDUSTRY		• Provides overall administration, enforcement and management of workplace health and safety program. Performs workplace safety compliance and training functions. • Adopts the state building code governing new construction and renovation.
DEPARTMENT OF BUILDINGS & GENERAL SERVICES	• Facilities Division	• Oversees construction, operation and maintenance of state buildings.
DEPARTMENT OF EDUCATION		• Issues new construction standards for schools. Inspects schools as part of state approval process.

Appendix A-5

Agencies with Indoor Air Quality Functions:
MONTGOMERY COUNTY, MARYLAND

AGENCY	OFFICE	DESCRIPTION
DEPARTMENT OF ENVIRONMENTAL PROTECTION	• Office of Environmental Policy & Compliance -- Air Quality Section	• Central IAQ program for the county. Provides technical assistance and information on general IAQ issues, including radon.
DEPARTMENT OF PERMITTING SERVICES	• Division of Building Construction Services	• Adopts county building codes, including radon-resistant construction standards.
DEPARTMENT OF FINANCE	• Division of Risk Management	• Investigates health and safety complaints of county workers.
DEPARTMENT OF HEALTH & HUMAN SERVICES		• Provides assistance to other agencies on medical aspects of IAQ problems. Carries out educational activities on environmental tobacco smoke.
DIVISION OF FACILITIES & SERVICES		• Oversees construction, maintenance and operation of county buildings.
DEPARTMENT OF HOUSING & COMMUNITY AFFAIRS		• Licenses residential properties and enforces county's residential housing code.
MONTGOMERY COUNTY PUBLIC SCHOOLS	• Department of Facilities Management -- Safety & Environmental Health Unit	• Provides technical assistance and information on IAQ for school construction, maintenance and operations carried out within school system.

Appendix B

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Principal IAQ-Specific Legislation

This table lists state laws that specifically address IAQ issues for each state surveyed. The table includes the principal IAQ legislation for each state, though it does not necessarily cover every law that indirectly addresses indoor air quality issues. Montgomery County regulations addressing indoor air quality are included in Appendix C - Principal IAQ Regulations.

Appendix B

IAQ-Specific Legislation

STATE/AGENCY	CITATION	SUBJECT	DESCRIPTION
California • Department of Health Services (DHS)	Health & Safety Code §§105410-105425	General IAQ	• Creates indoor air quality program focused on research and education.
California • DHS	H&S Code §§18615-18616	General IAQ	• Creates a toxic research and information program to develop standard methods for measuring IAQ and determining the source of contaminants.
California • DHS	H&S Code §105405	Volatile Organic Compounds	• Directs DHS to develop non-binding guidelines for reducing VOC exposure during construction and remodeling.
California • DHS	H&S Code §19881	Combustion Appliances	• Regulates sale of unvented heaters.
California • Air Resources Board	H&S Code §39660.5	General IAQ	• Requires ARB to assess human exposure to toxic contaminants indoors and to identify the contribution from indoor concentrations to total exposure.
California • California Energy Resources Conservation & Dev't. Commission	Public Resources Code §25402.8	Energy Efficiency & IAQ	• Requires Energy Commission to consider impact of energy efficiency standards on IAQ.
California • Dep't. of Consumer Affairs	Business & Professions Code §8538	Pesticide Application	• Requires registered structural pest control applicators to provide building owners or tenants with prior notice of pesticide application.
California • Dep't. of Industrial Relations	Labor Code §6404.5	Environmental Tobacco Smoke	• Restricts smoking in enclosed spaces at places of employment.
California	Civil Code §1102.6	Real Estate Disclosure	• Requires disclosure to potential purchasers of residential property of known existence of environmental hazards, including specifically radon, asbestos, lead-based paint, and formaldehyde.

Appendix B

IAQ-Specific Legislation (con't)

STATE/AGENCY	CITATION	SUBJECT	DESCRIPTION
Florida • Dep't. of Health	Fla. Stat. §404.056	Radon	• Requires radon testing in schools and certain care facilities; requires certification of radon professionals; requires disclosure of general radon information in real estate transactions; requires state to implement public education program.
Florida • Dep't. of Health	Fla. Stat. §381.006(2)	General IAQ	• Requires Dep't. of Health to carry out an IAQ testing and monitoring program to assess health risks from indoor air pollutant exposures.
Florida • Dep't. of Health	Fla. Stat. §386.201	Environmental Tobacco Smoke	• Prohibits smoking in public places, except in designated areas. Defines "public places" broadly and prohibits designation of certain areas as smoking areas.
Florida • Dep't. of Management Services	Fla. Laws 94-156	General IAQ -- State Buildings	• Requires the Department to submit to Legislature recommendations for improving IAQ in state-owned or leased buildings.
Minnesota • Dep't. of Health	Minn. Stat. §§144.412-417, 144.4165	Environmental Tobacco Smoke	• Prohibits smoking in areas where children or ill/injured persons are present and restricts smoking in public places.
Minnesota • Dep't. of Health	Minn. Stat. §§144.222, 240A.09	Enclosed Sports Arenas & IAQ	• Authorizes Department to adopt and enforce rules governing IAQ in the operation and maintenance of enclosed sports arenas. • Authorizes expenditures for rehabilitation and renovation of sports arenas, with priority to IAQ improvements.

Appendix B

IAQ-Specific Legislation (con't)

STATE/AGENCY	CITATION	SUBJECT	DESCRIPTION
Minnesota • Dep't of Education	House File No. 1, 1997 Special Session (6/26/97)	Schools & IAQ	• Requires that school construction and renovation projects demonstrate that IAQ issues have been considered. Requires that school health & safety plans include a plan to monitor and improve IAQ. Also requires Department to provide school districts with IAQ information, including an IAQ maintenance manual, an IAQ planning and construction manual, and a public information plan.
Minnesota • Dep'ts. of Education & Health	1993 Minn. Laws, Chap. 224, Art. 5, §44	Schools & Radon	• Authorizes school districts to include radon testing as part of their health and safety plans.
Vermont • Dep't. of Health	Vt. Stat. Ann., Title 18, §§1421-1428	Environmental Tobacco Smoke	• Restricts smoking in workplaces by requiring employers to prohibit smoking entirely or to designate smoking areas.
Vermont • Dep't. of Health	Vt. Stat. Ann., Title 18, §§1741-1746	Environmental Tobacco Smoke	• Prohibits smoking in public places, as broadly defined under law.

Appendix C

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Principal IAQ Regulations

This table describes regulations governing IAQ-related issues for each jurisdiction surveyed. The table covers four categories -- workplaces, schools, general building construction and environmental tobacco smoke (ETS) -- in addition to notable IAQ regulations on other subjects.

Appendix C

Principal IAQ Regulations

JURISDICTION	WORKPLACES[1]	SCHOOLS	GENERAL BUILDING CONSTRUCTION	ETS	MISCELLANEOUS
California	• Governs operation, inspection and maintenance of mechanical ventilation systems		• Establishes minimum ventilation requirements for residential and non-residential buildings (through energy efficiency code)		
Florida		• Establishes minimum ventilation standards for new construction • Requires HVAC inspection and evaluation • Requires integrated pest management plans	• Establishes minimum ventilation requirements incorporated into model code, which most localities have adopted • Establishes voluntary radon-resistant new construction standards	• Establishes procedures for enforcement of state smoking law	• Establishes procedures and requirements for certifications of radon professionals, as well as radon concentration limits in buildings
Minnesota	• Establishes standards for ventilation and temperature and requires CO testing and exhaust monitoring in certain situations		• Establishes minimum ventilation requirements for residential and non-residential construction (through Energy Code)	• Establishes requirements implementing state smoking law	• Establishes acceptable IAQ conditions for enclosed sports arenas and requires Dep't. of Health-issued operating certificate

Appendix C

Principal IAQ Regulations (con't)

JURISDICTION	WORKPLACES[1]	SCHOOLS	GENERAL BUILDING CONSTRUCTION	ETS	MISCELLANEOUS
Vermont		[• Recently-repealed rules established minimum ventilation requirements for new construction; rules being redrafted]	• Establishes minimum ventilation requirements for non-residential and residential construction / renovation (excludes single family homes)		
Montgomery County			• Establishes minimum ventilation requirements for new construction • Establishes radon-resistant construction standards for one and two family homes and single family townhouses		• Establishes minimum ventilation and filtration requirements and other energy-related standards for county-funded construction (in addition to county building code requirements)

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1. Refers to regulations that differ from Federal (OSHA) requirements.