

ARE INDOOR AIR QUALITY REGULATIONS REQUIRED  
FOR THE WHITE COLLAR WORKPLACE?

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The U.S. Occupational Safety and Health Administration (OSHA) is evaluating the need for indoor air quality (IAQ) regulations for non-industrial or "white collar" workplaces such as office buildings, bars, restaurants and other commercial establishments.

Based on occupational health research, contaminant levels found in non-industrial workplace environments pose no threat to health unless they exceed current OSHA regulations. Current OSHA regulation are seldom exceeded in the white collar workplace. The issue of comfort is, however, another matter. Many white collar workers complain of discomfort in their workplace. Thousands of studies undertaken in the U.S. and Canada have identified inadequate ventilation of buildings to be the primary cause of such complaints. There are many reasons for this, including inadequacies in building energy conservation codes and standards, HVAC System design, commissioning, maintenance and operation.

The consequences of adopting a separate set of regulations for white collar workers would be staggering. However, there is a series of voluntary ventilation and IAQ standards published by the American Society of Heating, Refrigeration and Air Conditioning Engineers that could be used as guidelines of comfort conditions to be provided for white collar workplace environments. This paper presents a framework for IAQ guidelines to protect white collar workers from adverse affects related to IAQ.

## INTRODUCTION

True or not, much of the public concern regarding indoor air quality (IAQ) problems in the white collar workplace stems from the energy saving design practices introduced in the 1970's. These design practices included tight building envelopes, inoperable windows and central HVAC systems which provided only a minimum amount of outdoor air. (1) The widespread discontent with IAQ that began immediately following imposition of energy conservation regulations by Federal, State, and local Governments is now known as "Sick Building Syndrome" (SBS). Symptoms associated with SBS range from irritation of the eyes, ears, nose and throat to headaches, dizziness and lethargy. Symptoms are accompanied by complaints about thermal, ventilation, and other comfort conditions provided by the building's heating, ventilation and air conditioning (HVAC) systems.

According to the World Health Organization (WHO), energy conserving design and regulation combined with pollutants from buildings have led to the decline in IAQ in the white collar workplace.(2) This situation has led to a public outcry for solutions, including government regulations.

#### **IAQ IN THE WHITE COLLAR WORKPLACE**

Since the initial outbreak of SBS in the late 1970's, there have been thousands of building studies worldwide by government organizations and private sector consultants. Most of these studies have identified specific causes of symptoms. Table 1 presents a compilation of 1846 studies undertaken in North America by the National Institute of Occupational Safety and Health (NIOSH) in the United States and the Department of Health and Welfare in Canada. (3,4) Those studies were undertaken during the 1980's by qualified investigators employed by, or consulting to, Federal Government agencies.

The conclusion is clear. Inadequate ventilation of buildings was the primary causal factor of IAQ problems in the white collar workplace of buildings investigated by Federal Agencies in North America. Outdoor contaminants were the cause of 9% of IAQ problems in Canada and 10% in the U.S. whereas indoor sources accounted for 16% of causes in the U.S. and 12% in Canada. These findings are not isolated to government agencies. Private sector consultants have also found the same results. (5,6,7) Those same studies have not shown a link between occupant symptoms and exposure to elevated levels of indoor contaminants.

The key to improving IAQ in the white collar workplace appears to be effective use of HVAC systems.

#### **A FRAMEWORK FOR IAQ REGULATIONS**

Some advocate a separate set of regulations for exposure to individual pollutants in the white collar workplace as the only means of avoiding IAQ problems. However, such a solution would neither be effective nor workable. In the U.S., for example, the Occupational Safety and Health Administration (OSHA) already has regulations in place to protect workers' health from undue exposure to toxic pollutants. These OSHA regulations are intended for application in all workplaces; industrial and non-industrial. The consequences of adopting a separate set of regulations for non-industrial workplaces would be staggering.

Nevertheless, the evidence may suggest that a review of existing regulations is required with respect to airborne substances that may cause symptoms of discomfort at low concentrations. For example, there are few workplace regulations which address workers discomfort, caused in part, by exposure to low levels of airborne substances in the workplace. However, HVAC standards and guidelines are available which, if followed, should provide comfortable working environments and can be applied equally in both industrial and non-industrial workplaces. Those standards and guidelines are the result of a carefully monitored consensus process of the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE).

ASHRAE is a technical society with a worldwide membership of more than 50,000 persons dedicated to the advancement of knowledge related to the comfort of building occupants and the processes of refrigeration. ASHRAE's development of standards started in the early 1930's. There are now more than 70 standards and guidelines published by ASHRAE. ASHRAE interacts with the American National Standards Institute (ANSI) that approves ASHRAE standards as American National Standards. Through ANSI's membership in the International Standards Organization (ISO) and the International Electrotechnical Commission (IEC), ASHRAE also participates in the development of international standards.

The ASHRAE standards and guidelines that affect indoor air quality in the workplace have also been approved as American National Standards by ANSI.

In 1987, ASHRAE, realizing the nature of the problem of IAQ and its root in building ventilation systems, published an industry position titled "The ASHRAE IAQ Position Statement".(8) The position statement called for ASHRAE research, education of members and the revision of standards and technical documents. The IAQ position statement set in place a strategy of ASHRAE response to the international IAQ problem.

This strategy has included revisions to the series of ASHRAE building energy standards, the ASHRAE ventilation standard 62-1989,(9) the ASHRAE thermal comfort standard 55-1981 (10) and development of Guidelines for Building Commissioning and Maintenance.(11) This series of ASHRAE standards could be used as guidance documents to assess comfort conditions in both industrial and non-industrial workplaces. These Standards form the basis of a "Building Systems Approach" to solving IAQ problems in the white collar workplace. There are convincing precedents for such a strategy.

Due to widespread complaints of IAQ problems, a number of U.S. States have developed IAQ regulations that are either adopted or in the process of review. About 25 state-wide codes and the vast majority of local codes (in states without a state-wide code) mandate minimum ventilation rates based on ASHRAE Standard 62-1989 "Ventilation for Acceptable Indoor Air Quality". For example, the State of Oregon created an Indoor Air Pollution Task Force (IATPF). In August 1991, the IATPF made the following recommendations to the Oregon State Legislature.

- 1 . Oregon's indoor air quality and ventilation standards should be revised based on the nationally recognized ASHRAE Standard 62-1989.
2. The outdoor air ventilation rates for residential and non-residential buildings should be based on ASHRAE 62-1989.
3. The occupant load for calculating the required ventilation rates should be based upon the number of persons reasonably expected to occupy the building.

A coalition of labour organizations led by the AFL-CIO essentially supports the position recommended by the State of Oregon in a submission to OSHA.(12) The unions find that deficiencies in ventilation are the root causes of IAQ problems

in the white collar workplace. The Unions recommend following the "Building Systems Approach" to IAQ rather than an approach centered around setting a separate set of standards for white collar workers' exposure to measuring specific contaminants. The Unions recommend adoption of ASHRAE Standard 62-1989 for the design and operation of HVAC systems to avoid IAQ problems.

Management appears to agree with this recommended policy of regulations. Through the National Environmental Development Association (NEDA) some of the largest employers of white collar workers in North America including such companies as AT & T, Allied Signal, and the B.F. Goodrich Company advocate a Building Systems Approach to regulation.

The Building Owners and Manager Association (BOMA) in a joint project with the U.S. EPA also recommends a Building Systems Approach based on ASHRAE Standard 62-1989. These recommendations are contained in an EPA Handbook endorsed by BOMA, designed to avoid IAQ problems in the white collar workplace. (13)

## DISCUSSION

IAQ problems in the white collar workplace have been shown to primarily cause symptoms of discomfort rather than serious health impairment. HVAC systems have been shown to be the primary cause of such discomfort.

Government, labor, management and building owners agree that solutions are required and advocate a building systems approach based on ASHRAE Standards, particularly Standard 62-1989. However, whereas government and labor recommend new regulations to mandate the building systems approach, management and building owners caution that regulations may be premature and that government regulations should be considered only when it is justified scientifically and only when the technology exists which will allow industries to comply.

There is now consensus that a Building Systems Approach based on ASHRAE Standard 62-1989 is the appropriate means of solving IAQ problems in the white collar workplace. There does not appear to be a need for regulations other than adoption of this Standard by appropriate government bodies.

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TABLE ONE

CAUSES OF IAQ PROBLEMS IN 1846 WHITE  
COLLAR WORKPLACES INVESTIGATED BY  
NORTH AMERICAN GOVERNMENT AGENCIES

<u>Problem Type</u>	<u>NIOSH (484 Buildings)</u> Crandell, 1987		<u>HWC (1362 Buildings)</u> Kirkbride, 1990	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Inadequate Ventilation	252	52	710	52
Indoor Contaminants	77	16	165	12
Outdoor Contaminants	48	10	125	9
Building Fabric	20	4	27	2
Biological Contamination	26	5	6	0.4
No Problem Found	61	12	329	24