

A GROWING EPIDEMIC

Part IV: “Sick Building Syndrome” (SBS) — Microbial Pollutants

By far the worst known pollutants is the one that you cannot see, but they are everywhere.

In the last three articles on “Sick Building Syndrome,” we have explored many causes and sources behind this growing epidemic. In this article we will explore the most potent of all the pollutants—microorganisms.

Microbes are a part of our everyday lives. They are found on all environmental surfaces, in the air and in the water associated with normal or catastrophic events. Microbes can, given certain conditions, multiply from one organism to more than one billion in just 18 hours. Unfortunately, most people think that since they cannot even see these organisms, they offer no real threat to us humans. In reality these microscopic beasts, among other factors, are being implicated as primary and contributory factors leading to an array of health concerns in the work place.

The broad spectrum of microbes are particularly potent because they can cause a full breadth of discomfort, irritation, sensitization, toxic reaction, and disease. When employees start to develop symptoms associated with “Sick Building Syndrome” they point the finger at anything or anybody. From this stems many company problems; low morale, loss of productivity and unwanted employee turnover are just a few.

Do not be panicked by the somewhat frightening array of microbial pollutants. Microorganisms fall into three basic categories: Bacteria, Fungi, and Algae. Some of these organisms only flare up as problems under very unusual conditions. Most microorganisms are at levels in buildings that do not cause problems for normal healthy individuals. Their balance is generally controlled by your operating conditions and housekeeping practices. The problem for building administrators occurs when there is an upset of this balance. In addition, the fact that 30% of the general population has some form of respiratory handicap, asthma or allergies amplifies the imbalance. As does the growing population of “immunosuppressed” people such as AIDS, organ transplant, or cancer patients. These “at-risk” people are further added to, when you include the very young and the elderly.

Bacteria, in its growing stages, usually needs lots of water. This is why Legionella spp., the causative agent for Legionnaire’s Disease, is associated with showers, cooling towers, humidifiers or other water sources such as standing water near a fresh air intake. Elevated levels of endotoxins, the toxins produced by bacteria, have been measured in agriculture, the biotechnology industry, swimming pool areas, and in office buildings. The respiratory complications caused by these toxins are somewhat understood, but their real importance in “Sick Building Syndrome” events may be obscure and is yet to be determined.

Another group of microbes is Fungi. Most commonly known as bread mold or yeast, fungi are found in

all areas of a building but are most often a problem in areas that see a lot of moisture or have been significantly wet. The moisture allows these organisms to “bloom”(grow rapidly). During the rapid growth stages, these organisms give off odors, cause deterioration, and spread their irritating and allergy stimulating reproductive spores for unknowing people to encounter.

We see tremendous variation in fungal types and numbers depending on indoor surfaces, time of year, weather conditions, and even geographical area of your facility. Average temperatures, rain fall, land topography, the surrounding environment, coastal or river sited versus an inland plain, are all part of the factors that determine the types of fungal contaminants in a building. Fungi are a very common part of the outdoor air and so finding them in buildings is not a big surprise. If you smell them or if you see their characteristic stains, they are a problem and it's only a matter of time before your employees become affected.

The various fungi that occasionally receive “bad press” are generally those that are known to produce chemicals referred to as mycotoxins or aflatoxins. These chemicals are known to cause headaches, bleeding of the lungs, and cancer in agricultural workers, babies, or sick individuals that may be more susceptible than young, healthy people. Exposure routes, doses, pathogenicity and susceptibility of individuals are not fully understood but when these organisms are present they should be considered a serious concern and actions should be implemented. Stachybotrys chartarum, Aspergillus flavus, Aspergillus versicolor, and a few others are prominent in this group of fungi both because of their prevalence and their ability to be identified.

Algae, the most understudied of all microbial pollutants, are not commonly thought of as part of the microbial pollutant profile of the indoor environment. However, they can be significant. Algae found in indoor environments can cause staining and are known to have proteins that stimulate allergic response in sensitive individuals.

This review of indoor microorganisms hopefully provides an overview for those of you faced with the everyday and unusual problems caused by microorganisms in buildings. In the next issue we will examine some of the mitigation and protection strategies useful for dealing with the human and building related consequences of indoor environmental pollutant problems.

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