Unhealthy Condos:

Tracking Down the REAL Problems

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Conventional wisdom says the cause of unhealthy high-rise residential buildings is due to a lack of fresh air from the energy (HVAC) system. Should you accept that premise, you have fallen into a logic trap.

Indoor Environmental Quality (IEQ) in a building, as well as the energy system, is inextricably bound, yet the energy system is seldom the cause of IEQ problems. Poorly designed or maintained systems contribute by creating conditions that encourage the spread and severity of problems, but the source and blame for many IEQ problems lies elsewhere.

An energy system conceived as part of an environmental program provides building occupants with physical comfort as well as optimum conditions for productivity and health. Conversely, a system that ignores environmental effects, and focuses solely on energy efficiency, can cost millions of dollars in lost time and productivity, occupant healthcare, and ultimately in renovation or remediation.

The Energy System Indictment

IEQ has become a major focus of legal, public, and regulatory attention, while our modern energy efficient buildings stand accused. Is the Sick Building Syndrome (SBS) phenomenon simply an overblown exploitation of another new victim? People assume that SBS must be a high-tech problem with a high-tech cause. Despite repeated alerts from microbiologists and medical researchers, we tend to ignore the potential danger of the fuzzy green and gray stuff that smells and grows in our buildings. We've also ignored concerns regarding disease-causing germs left on everything we touch and breathe on. It's time to remedy that mistake.

The Fuzzy Gray Stuff

Microorganisms (or microbes) are part of our everyday lives and environments. By the time they are large enough to see, you aren't looking at one microorganism; you are looking at hundreds or millions. At that point the question isn't whether or not you have microbial contamination, it's *How badly?* and *How dangerous are the organisms?*

In indoor environments, microbes are found on all environmental surfaces, in the air and in water associated with both normal and catastrophic situations. The few highly publicized outbreaks of Legionnaires Disease and the more complex indoor issues of today such as Sick Building Syndrome (SBS) and Building Related Illness (BRI) have begun to put microbiologists and microbiological sciences in the headlines and on the line.

The Building Biosphere

A building can be thought of as a biosphere containing organisms in a constant flux. Nutrient and humidity changes, as well

as alteration of life-limiting (toxic) surfaces, allow microbes to adjust and adapt to ever-changing conditions in their environment. The buildings in which these organisms thrive are not simple environments. They are increasingly complex ecosystems as a result of constant changes a building undergoes in its life cycle. Associated with buildings and their inhabitants are the full range of microorganisms: bacteria, fungi, viruses and algae. They are particularly potent as they can amplify and cause the full breadth of discomfort, irritation, sensitisation, toxic reaction and disease we associate with indoor environmental quality.

Elevator buttons require protection.

What Causes Microbial Exposure?

Microorganisms in a building are complex. Every element of a building, its furnishings and its people, offers a home for microorganisms. Microorganisms need moisture and nutrients, and more than 95% need to be associated with a surface.

Moisture can come from catastrophic or normal events – a leaking roof, sweating pipe, leaking radiator, condensation, humidified air from the HVAC system, and countless other sources. A condominium facility often compounds the problem with moisture from pools, spas, individual air conditioners and hundreds of bathrooms. This, coupled with wall-to-wall carpeting, draperies, wall coverings, furniture, bedding and ceiling tiles, creates ideal habitats for microorganisms. Given acceptable growth conditions, some types can multiply from one individual organism to more than one billion in just 18 hours.

Airborne Pollution

Although organisms grow and survive for extended periods on receptive building surfaces, they become airborne through normal occupant traffic and activities such as vacuuming. Once airborne, the HVAC systems, makeup air shafts and elevator shafts transport the microorganisms throughout the building. They settle on other receptive surfaces and begin to reproduce or transport from person to person.

Traditional Solutions

For years, mould and bacteria have been recognized as major causes of problems in buildings, although most of the recognition had focused on odours, rot and unsightly growth rather than on human health problems. There has been an unending array of products, cleaners, chemicals, devices, strategies, and methods available to combat microbial problems from mildew to pathogenic bacteria as follows:

- **Housekeeping procedures:** Housekeeping professionals regularly scrutinize building spaces and remove any visible growth. Detergent/sanitizer products are effective short-term tools against visible mould and mildew as well as bacteria and other "germs" found on high-touch surfaces. All are short-term solutions and many of the products present their own toxicity problems. As problems develop, cleaning personnel frequently use perfumes and fragrances to mask or disguise the problem, creating more of a problem than they solve for allergic and sensitive individuals.
- **Engineering procedures:** Most tactics in this category include selection, operation, modification, and maintenance of HVAC systems to permit better temperature and humidity control and better filtration. This does not address microbial infestation or eliminate growth sources, but it can reduce the rate of mildew growth.
- **Industrial hygiene procedures:** Most industrial hygienists and health professionals have challenged the importance of added fresh air and have concentrated on identifying and removing and/or containing sources of pollutants (chemicals) and routes of pollutant transmission. This focus has created an army of consultants and a very lucrative testing industry. Unfortunately, most authorities concede they have been able to identify a specific cause in less than twenty percent of acknowledged sick buildings.
- **Additional procedures:** As buildings age, the normal routines of clean-up and masking become less effective. Mould and mildew adapt to conventional sanitizers and biocides, and many develop immunity. We also see that certain species of fungi will find the engineered humidity and temperatures to their liking and will begin to thrive. As we adjust our indoor environments for the comfort of occupants, we also create ideal habitats for a large variety of microorganisms. When this happens, major corrective actions are required. These include replacement of furnishings such as carpeting and other soft goods, major building repairs and upgrading components of the HVAC system.

A Non-Traditional Solution

In 1969, researchers at Dow Corning Corporation discovered a unique way to attach biocidal agents permanently and directly to a wide variety of surfaces. The resulting non-volatile polymer is unique among antimicrobials as it does not create a zone of inhibition and does not dissipate over time. This

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extraordinary technology permits continuous, durable activity against mildew required to prevent infestation. As the material does not lose effectiveness through absorption or dissipation, microorganisms have never been shown to develop immunity against it.

For the very first time, Dow Corning's new technology has made it possible to actually control the growth and survival of mould, bacteria and other microorganisms on any treated surface – even after repeated cleanings and extended use.

This unique technology, now the AEGIS Microbe Shield, is widely used and is known for its long-term effectiveness in the control of microbial contamination in indoor environments. Case histories and peer review publications show how this material, as part of a total IEQ program, provides relief and protection from indoor microbial problems.

Treated surface with AEGIS Microbe Shield.

Defensive Strategies to Reduce the Risk

Proper maintenance of the air handling system, other buildings systems and structural elements are critical. The transport routes of infiltration and exfiltration, especially make-up air shafts, elevator shafts and cooling coils, are commonly neglected and must be maintained and protected. Even doorknobs, elevator buttons and similar high-touch surfaces can serve as carriers for bacterial transmission and can be protected. Proper targeting of surfaces will mitigate existing problems and greatly lower the odds of future contamination.

The Future

With technologies in hand, we are at the threshold where energy management principals and benefits can be merged with the critical needs for improved IEQ. We can't ignore the critical relationship between energy management and the indoor environment. We need greater understanding and coordinated efforts within the professions and governmental agencies charged with addressing these vital issues. ■