



COVER STORY

Is Your Office Killing You?

Sick buildings are seething with molds, monoxide--and worse

Everything was running perfectly that spring afternoon at the courtyard-style Best Western Springdale in the suburbs of Cincinnati. Room service was humming along at a reliable clip. The floral-patterned comforters were getting fluffed. Kids were splashing in the pool. Then, suddenly, General Manager Jim Crane got an emergency call about a leak that was turning Room 529 into a virtual waterfall. Within minutes, he and the hotel's burly engineer were ripping apart the room's walls. Inside, they found something out of a B-grade horror movie: a deathly smelling mold so gooey and hairy it seemed like it was breathing.

Crane soon discovered that, like the Blob, the Aspergillus strain of mold was everywhere: swarming through bathrooms, sprouting out of ceilings, and creeping through the ventilation and vending machine areas. This was May, 1998, and for the next year Crane worked to rid the hotel of the mounds of black growth. He knew they were a disaster for guest relations, but what he didn't realize was that each time he took a breath, he was inhaling the mold's toxic fungal spores. These bioaerosols landed on the delicate mucous membranes of his airways and lungs, causing chronic inflammation and eventually leading to a medical diagnosis of hypersensitivity pneumonitis. The condition further scarred his lungs and eventually progressed into pulmonary fibrosis, a disease that is painful, debilitating, and sometimes even fatal. Slowly and invisibly, his workplace was killing him.

Today, Crane wheezes on his living room sofa--paying bills with his retirement savings and taking 17 different drugs each day. He filed a lawsuit in January against the hotel's owners, Laks Enterprises, which wouldn't comment on the suit. They lost the hotel through foreclosure to Bank of America in September after spending more than \$2 million on an exhaustive remediation, and "the hotel is now safe," says the hotel's director of sales, Karen Sullivan. Already, though, Crane has lost half of his lung capacity. Says Crane's physician, Dr. Eckardt Johanning, medical director of Eastern New York Occupational & Environmental Health Center in Albany: "Lack of proper protection and maintenance in that building caused this tragedy."

NO STANDARD. Crane's case may be an extreme example of what can happen when you work in a sick building, but he is hardly alone. Employees at Levi Strauss, US West, BP Amoco, even the Environmental Protection Agency, have claimed they suffered sick-building-related illnesses. Cases like these happen so often, in fact, that the World Health Organization estimates that one out of every three workers may be toiling away in a workplace that is making them sick.

The culprit: a stew of largely undetected dangers--from the carbon monoxide and other contaminants sucked into a building when air-intake vents overhang exhaust-filled loading docks and parking garages, to the volatile organic chemicals (VOCs) seeping out of building materials, furniture, office equipment, carpet, paint, and pesticides, to the molds and bacteria funneled through muck-filled heating, ventilation, and cooling systems (HVACs). Even the smoke from those puffing away at entrances gets sucked back into the building, chimney-style, because of the suction from revolving doors (what engineers call "the stack effect").

Putting in workaholic hours amid these contaminants is bad enough, but what makes it even worse is that, unlike at home, most of us can't even crack open a window at the office. Instead, we breathe yesterday's air and work in monotonous, uniform spaces under a forest of fluorescents, which can cause boredom, eyestrain, and lethargy. For those with robust immune systems, this may not matter much. But for 20% to 30% of the office population, the problems can range from the mild--headaches, nausea, dizziness, short-term memory loss, irritability, and itchy eyes and throats--to possible damage to the nervous and respiratory systems. Doctors also link the doubling of asthma rates since 1980 to bad indoor air.

Associated with sick-building syndrome is a controversial disease called multiple chemical sensitivity (MCS), which can make people allergic to almost anything containing a man-made chemical. This condition can sideline sufferers into surreal, boy-in-the-plastic-bubble worlds: Don Paladin, a former teacher, got MCS from pesticides sprayed at his school and is now forced to spend most of his time in his aluminum-sided "sanctuary." Other MCS victims say they are forced to live outside or sport medical masks wherever they go. No wonder the EPA calls indoor air quality one of the top five environmental health risks of our time.

But even as the evidence mounts that sick-building illnesses are on the rise, the extent of the problem has been almost impossible to measure. Amazingly, the federal government has no effective standards for indoor air quality in offices. The Occupational Health & Safety Administration (OSHA) has standards that are supposed to protect workers against individual contaminants such as benzene and formaldehyde, both carcinogens. But those standards were set for industrial workplaces and have been force-fit to apply to white-collar offices. "The OSHA standards don't always protect you from all kinds of exposures that people are having at the office," says Elissa Feldman, EPA's associate director of the Indoor Environments Div. "There is no federally guaranteed protection from exposure to unhealthy air indoors."

What's more, the chemical soup swirling through office air "is a complex mixture that we just don't know that much about and no one has set standards for," adds Feldman. "We're not [always] sure of the health effects." This, despite the fact that we spend 90% of our time inside--and more than half of that at work. What's also scary is that pollutant levels indoors are two to five times, and on occasion 100 times, more concentrated than outdoors, according to the EPA. "There are offices in America that I've been in that were probably more dangerous to my health than a Superfund site," says William McDonough, former dean of the University of Virginia School of Architecture.

WORKER CLAIMS. Twenty years ago, sick-building complaints were often written off as the psychosomatic rantings of the disaffected--or just the whining of lazy boss-haters. Rare cases--like the shocking outbreak in 1976 of a mysterious lung ailment during an American Legion convention (now known as Legionnaires' Disease)--were considered medical aberrations that couldn't become commonplace. Today, those attitudes are fading in the face of new research buttressing the validity of sick-building syndrome, including new studies linking symptoms to buildings that are damp or freshly renovated.

Experts who study illnesses caused by buildings divide them into two categories. The first--building-related illness--is when readily identifiable microbes or fungi give people actual diseases, like the Legionnaire's outbreak in April from bacteria blown out of the Melbourne aquarium's air-conditioning system that killed four people and infected 99 others. The second--sick-building syndrome--is when people report symptoms that can't be traced to one cause. Local governments are now starting to

legitimize these sick-building-related illnesses as a condition for social benefits. Nearly a dozen states from New Mexico to Maryland now recognize MCS as a bona fide claim for workers' compensation. MCS is also covered--on a case-by-case basis--under the Americans with Disabilities Act, obliging employers to make accommodations for sufferers.

U.S. companies could save as much as \$58 billion annually by preventing sick-building illnesses and an additional \$200 billion in worker performance improvements by creating offices with better indoor air, say researchers William J. Fisk and Arthur H. Rosenfeld of the Lawrence Berkeley National Laboratory in Berkeley, Calif. The researchers also found that the financial benefits of improving office climates can be 8 to 17 times larger than the costs of making those improvements. And the same VOCs that affect people can also harm expensive equipment. They create a film that covers computer circuit boards and telephone switches, causing them to blink or conk out, say Telcordia Technologies Inc. senior scientists Charles J. Weschler and Helen Shields. Just fixing those faulty phone wires has cost telecommunications companies more than \$100 million over the past 10 years, they say.

Legal heat is also focusing attention on the issue. Last year, in a landmark case, the Ohio State Supreme Court awarded Joann Taylor an unprecedented \$400,000 jury award from her former employer Centerior Energy Corp., now a part of First Energy. The charge: She was forced to keep working in her newly renovated office even after she had been rushed to the hospital with chest pains and vomiting from the chemical fumes in the new carpet. First Energy says no other employees had complaints and that Taylor had to keep working in that building in order to perform her job.

SKYLIGHTS. Indeed, sick-building cases are becoming more and more common--and are often filed against building owner/operators. While there were only a few such cases five years ago, today "there are hundreds," says New York environmental consultant Wayne Tusa. It all adds up to indoor air becoming the next big environmental target, just as awareness of outdoor pollution led to the landmark Clean Air Act of 1970. Indeed, compared with European building standards, the U.S. seems stuck in the environmental Dark Ages (page 124).

But despite this growing climate of recognition, sick-building syndrome remains controversial. Many employers and building owner/operators say workers exaggerate illnesses. Doctors are often split on the issue, one camp dismissing many of the claims as hysterical, while the other sees them as the tip of the iceberg, foreshadowing a kind of chemical AIDS they say could be the scourge of the 21st century.

Even a company that does the right thing by being honest with employees about a building's dangers can be trapped in a legal quagmire. That's what happened to BP Amoco PLC after the company discovered a cancer cluster at its Naperville (Ill.) lab (page 128).

But a few businesses are taking action long before they get into trouble. At its Zeeland (Mich.) factory, furniture maker Herman Miller has created a virtual California. Workers sport Hawaiian shirts and blast the Beach Boys while working in an office that has 100% fresh air and daylight. After the factory opened, productivity improved by 1.5%, enough to pay off the building's \$15 million mortgage. The place is so popular that 16 workers who quit last year for better-paying jobs all returned within two weeks because they said that they couldn't stand working in the dark. The U.S. Postal Service saw an even higher productivity gain--a stunning 16% jump--by simply installing skylights and improved lighting at its Reno (Nev.) postal sorting office. "If any CEOs have half a brain, they would start to pay attention to the fact that their employees are their main cost-and-benefit center," says McDonough, now a consultant with Herman Miller and Steelcase. "They can't afford not to do this."

Blame the prevalence of sick buildings, in part, on the energy crisis of the 1970s. That's when office buildings began to be built as tight as tin cans, padded heavily with money-saving layers of insulation and equipped with hyperefficient HVACs. In many cases, these systems, run by operators looking to shave costs, suck in only five cubic feet of fresh air per minute per person. "That is almost enough to keep people alive," quips New York architect Robert F. Fox Jr., whose firm designs environmentally friendly skyscrapers. Indeed, to save money, some operators shut down the fresh-air intakes altogether. The American Society of Heating, Refrigerating & Air Conditioning Engineers recommends that HVACs pump

in 20 cubic feet of fresh air per minute per person--a level below which symptoms increase. But there is nothing compelling building operators to do so, says Mark J. Mendell, team leader for the indoor-air-quality research effort at the National Institute of Occupational Safety & Health (NIOSH).

Stagnant office air also circulates the residue of as many as 350 VOCs that are emitted by building materials, furnishings, and office machines. For example, most office paints contain solvents that can cause everything from eye, nose, and throat irritation to digestive and central nervous system damage. Carpeting sometimes contains PVCs that give off the carcinogen dioxin. Furniture is often made of particle board that is bonded with resins made with carcinogen-containing formaldehyde. That's not to mention the pesticides and cleaning products swabbed over offices that, according to the EPA, may also contain carcinogens that can be discharged into the office air.

No surprise, then, that sick-building-related symptoms are on the rise. Across the country, doctors who treat patients with sick-building-related illnesses say caseloads have mushroomed 40% in the past decade. "There are more and more chemicals being introduced into the office environment through synthetic products, and ventilation systems have not caught up with being able to deliver fresh air," says sick-building specialist Dr. John B. Sullivan Jr. of the University of Arizona College of Medicine.

What makes it difficult for sufferers seeking remedies is that OSHA has no exposure limits for groups of chemicals that researchers believe might act synergistically. OSHA standards for acceptable amounts of benzene, for example, don't take into account the mixture of VOCs reacting with one another. This could be making building air even more dangerous, but because scientists don't yet know for certain how to measure for these combinations, the problems may be going undetected. That could also help explain, scientists say, why some buildings that are making people sick are getting clean bills of health. Or it may be that where standards do exist, OSHA's permissible exposure levels, which are often influenced heavily by politics and industry, are just too high. "These exposure limits don't have any real bearing on what's happening in white-collar office buildings," says Alan Hedge, professor of human ecology at Cornell University. "In terms of chemical irritation, we're seeing symptoms at levels way below OSHA's standards."

"DEATH CUBE." An effort to enact sweeping indoor air standards stalled six years ago, when OSHA tried to issue a comprehensive smoking and indoor air-quality rule. The measure would have required all building operators to do basic, routine ventilation checks, change air filters regularly, and avoid using toxic cleaning substances. Not surprisingly, Big Tobacco went into overdrive behind the scenes to torpedo the move since the measure would have required all workplaces to be smoke-free. Shortly thereafter, in 1995, the 104th Congress was ushered in, and it fiercely opposed any new government regulations. The effort was squashed. "Clearly, [sick-building syndrome] is a significant problem--though it is difficult to say how bad it is," says Charles N. Jeffress, Assistant Labor Secretary for Occupational Safety & Health. "And it is very difficult to do something about it." That may be true at the federal level. But as states pass their own laws, Jeffress thinks it may be possible to learn which approaches work and which don't.

Until then, the stories are likely to mount, though they rarely make headlines. At Levi Strauss & Co., for example, internal memos obtained by Business Week show that for eight years, at least 60 employees complained about the air quality at the jeans maker's Stern office building in San Francisco. The workers were especially concerned about smoke from the wood-burning oven in the Il Fornaio restaurant on the ground floor. The mesquite-flavored fumes hung so heavy in the air that some employees rigged umbrellas over their desks to protect themselves from falling soot.

At least three people became disabled from acute asthma, severe allergies, and other environmental illnesses as a result of breathing in the carbon monoxide, the memos show. Things got so bad, employees say, that one office even got the grim nickname "the death cube" because three people who occupied it all died of cancer. Levi's took steps to revamp the building's ventilation system over the years, but the complaints persisted. "It proved to be challenging to track the problem down and find the right steps to resolve it," says Linda Butler, Levi's senior manager for communications. Finally, the company raised the air intake vents in 1997 so that the fresh air wasn't commingled with the exhaust from the restaurant, and the problem was fixed, Butler says.

Sometimes, the trouble doesn't stem from an ongoing problem but from one simple renovation project. In 1991, at a former US West office in Walla Walla, Wash., some construction workers forgot to cover up the air-intake vents when they sprayed industrial-strength petroleum sealant on the building's facade as a part of a roofing and refurbishing project. Workers like clerk Juanita Johnson and telephone operator Rosie Gies, who had had a perfect attendance record during her first six years with the company, began suffering from nosebleeds and dizziness. "I could barely breath at work because it hurt so much," says Gies, who eventually developed a case of reactive airway disease so debilitating that she says she couldn't lift her 3-year-old daughter. US West closed the office in late 1996 when it consolidated its directory centers. "We did testing by independent consultants and found compounds well below OSHA's permissible exposure limits," says US West Communications Director Dana Smith.

Often, that's exactly what happens. Companies bat away complaints with test results showing that their workspaces meet OSHA standards. But when the standards clearly have been violated, lawsuits such as Celeste Morrell's can follow. Morrell was a case worker in the Social Services Dept. of New York's Onondaga County in 1988 when her department received a new shipment of wooden desks that had a foul, chemical odor. Turns out the double-pedestal desks, like much furniture, was made with particle board consisting of chips of wood glued together with formaldehyde. After breathing in the fumes all day, Morrell, a widowed mother of two, said she felt sick. When investigators scoured the office, they found formaldehyde levels in desk drawers that were up to five times OSHA's standard for short-term exposure. Morrell's physician diagnosed her with formaldehyde poisoning and ordered her not to work within 15 feet of the desks, but she soon developed multiple myeloma, a form of cancer her doctor linked to her office. Last September, just six months after her suit went to nonjury trial, Morrell died at the age of 51. A judge is still deliberating. "Her desk killed her," says Morrell's attorney, Peter Littman of Ithaca, N.Y. Marc Violette, spokesman for the New York State Attorney General, says the state won't comment on the suit until after the judge has ruled.

HEAVY METAL. To make sure they never end up in court, some building owners, such as New York developer Durst Organization, are taking steps to erect greener and cleaner buildings on their own. Durst's newest building, the rocket-shaped Conde Nast tower, has solar panels, air intakes on every floor, and filters that screen out 85% of the city's contaminants (most buildings have filters that only keep out 35% of impurities). Some manufacturers, such as office furniture makers Steelcase and Herman Miller and office carpet maker Interface, are using materials in office furnishings that are less dangerous--a much needed move since many of the textile trimmings used in office fabrics, for example, are considered hazardous waste, a result of the heavy metal content of the dyes and sealants used. Consider the office chair: "Most people are sitting on chairs that are an amalgam of hundreds of chemicals that have never been defined in terms of their effects on human health, and the deeper we look, we find things that are cancer-causing chemicals," says the University of Virginia's McDonough.

Following the lead of these pioneers could well pay off for more companies. Time off from work due to illness can be cut by as much as 30% if workers simply have control over their office air, one study shows. Some states, such as New Jersey and California, are leading the way by enacting some indoor air standards. The EPA is also conducting its first-ever national assessment of the health of the country's office building stock, the biggest such study ever to be performed. Getting a better rating than the norm could be a marketing hook and might allow owners to charge even higher fees in today's helium-filled real estate market.

All this may signal the day when owner-operators make it a priority to choose building materials that are safer, companies demand air-quality reports before signing leases, and employees are as aware of their office's health as their own. Just like stock options and signing bonuses, workers are certain to start demanding fresh air and sunlight once they find out that other employees are getting them. Perhaps one day the office will even have its own annual checkup. If not, many American workers may not be around to complain. They'll be at home--sick.

Diagnosing a Sick Office

1. Interview people with symptoms--and review records of past complaints to determine possible causes. Is the HVAC system dirty? Has the bathroom recently flooded? Is there a renovation being done on the floor below?
2. Ask your building operator to conduct an investigation and give you records of past complaints.
3. Hire your own outside specialist in indoor air quality/HVAC, and compare results with the building operator's. This will protect you against a building operator who is trying to hide something.
4. Share all information with employees--secrecy breeds fear.
5. Monitor results.

Join an online discussion of sick buildings at www.businessweek.com/forums/

By MICHELLE CONLIN
With John Carey in Washington

DO YOU WORK IN A TOXIN FACTORY?

The modern office is home to as many as 350 different volatile organic chemicals released by building materials, furnishings, and office equipment. That's not to mention the molds and bad indoor air that often flourish in these sealed-up environments. Some of the biggest offenders:

Printers and fax machines

They all ooze ozone. Scientists have yet to figure out definitively what happens when that ozone mixes with the workplace's other volatile organic chemicals.

Smoking

When people in your office sneak a smoke—even if it's behind closed doors—the second-hand stuff funnels through the ventilation system to the rest of the office.

Exterminators

It doesn't help that exterminators spray pesticides that may contain carcinogens over your workspace.

What fresh air?

Believe it or not, many fresh air vents are located over loading docks and parking garages, sucking in carbon monoxide and other contaminants.

Hidden Dangers: A Glossary

HVACs Heating, ventilation, and air-conditioning systems. Often they circulate contaminated air.

VOCs Volatile organic chemicals. They're emitted by furnishings, cleaning products, and equipment.

MCS Multiple chemical sensitivity. Sufferers are hypersensitive to chemicals.

CCP Carbonless copy paper. Found in credit-card and bank receipts. It contains known and probable carcinogens.

Sealed windows

Most people now work in enclosed offices. Not being able to crack open a window means that you're relying on building managers to pump through enough fresh air—something they don't always do.

Carcinogenic cleaning products

There are 70,000 chemical cleaning products on the market, many of which are used to clean up your office. Some of these products may contain carcinogens.

Copy machines

They also emit ozone. What's worse, they are not always next to vents, so their emissions stay trapped in the office air.

The office bathroom—the modern mold machine

Who hasn't seen a clogged toilet? Flooded bathrooms can create molds.

The stack effect

Co-workers who smoke may think they are doing you a favor by taking it outside. But experts say this can be even worse. When you open the revolving door, the building sucks in the second-hand smoke like a chimney.

Renovations

Working in a building—especially those with sealed windows—can cause workers to inhale paint fumes, construction dust, and odors from new furnishings that can irritate skin, eyes, and airways.

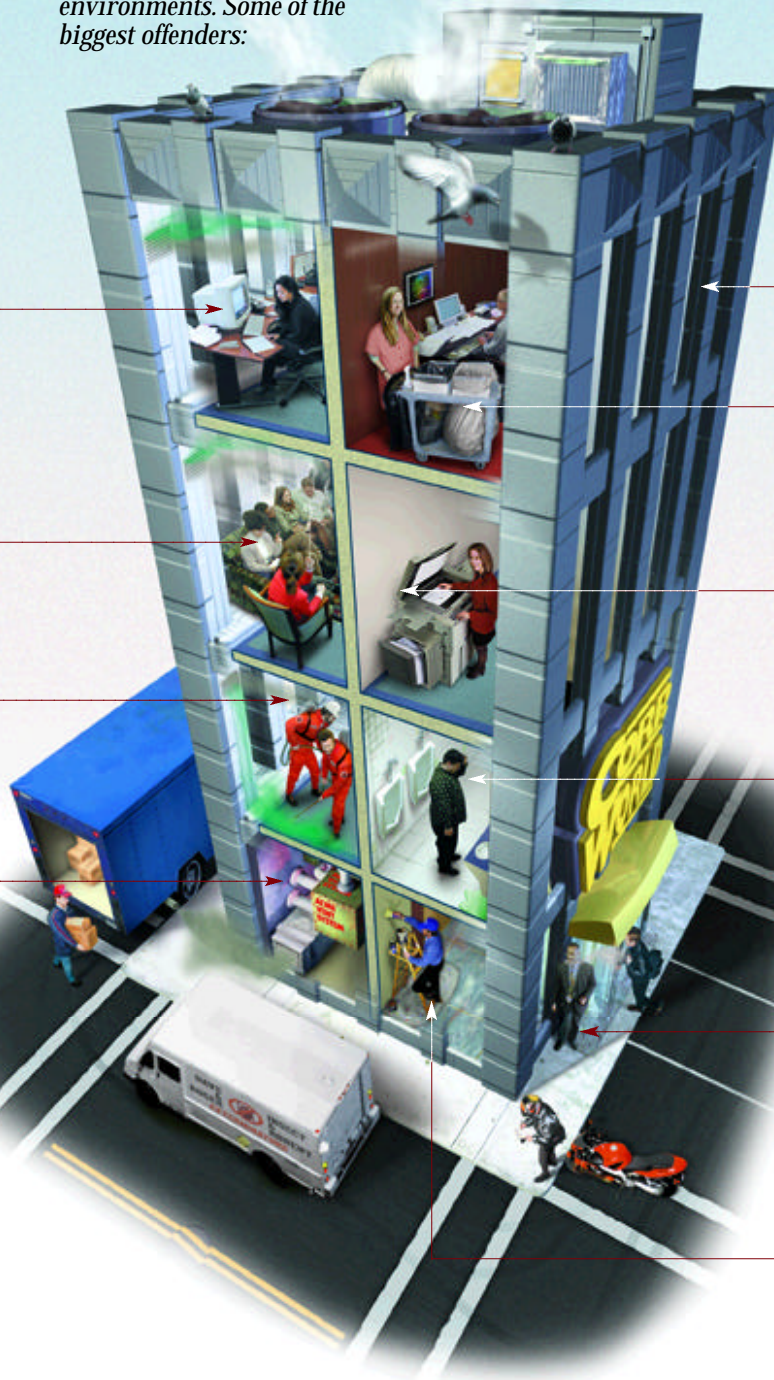


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