

Guidelines Can Protect Your Firm From Mold-Contamination Headaches

New York City adopted these guidelines for exposure suppression and containment during mold remediation

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The legal and health risks associated with mold contamination in water-damaged buildings are issues of increasing public concern.

This heightened public awareness, combined with the highly charged emotional aspects of this issue, readily lends itself to the spread of misconceptions, exaggerations, and rumors leading, in some cases, to legal actions.

To protect themselves, HVACR professionals involved in disaster restoration or remediation must take the proper steps to ensure compliance with the standard of care.

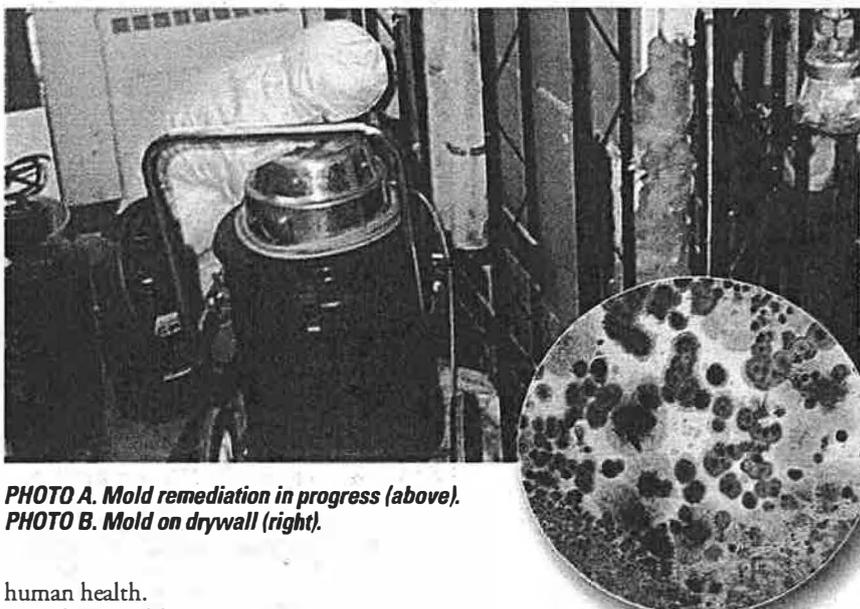
This article briefly describes some of the health effects that have been attributed to mold exposure. It also discusses recently issued guidelines pertaining to mold spores and how to limit further exposure during the cleaning and remediation of mold-contaminated buildings.

HUMAN HEALTH AT RISK

Although the health hazards of some agents, such as mycotoxins, remain highly controversial, there is no doubt that mold spores can and do cause serious health effects.

Health hazards posed by molds in agricultural products have been known for many years. And it is true that, since mold spores grow outdoors, they are found virtually everywhere. So individuals with allergies can have mold-related health problems even without exposure to indoor mold.

However, over the last 20 to 30 years public health experts have become much more aware of the potential risks that molds in indoor environments may pose to



**PHOTO A. Mold remediation in progress (above).
PHOTO B. Mold on drywall (right).**

human health.

Indoor mold can grow on any porous building material surface, including ceilings, walls, ventilation systems, and carpets—anywhere that water accumulates or where water damage has occurred.

Because mold spores can spread throughout a building via ventilation systems, remediation efforts can expose occupants physically removed from the space where the mold is actively growing.

There are three basic mechanisms by which molds affect human health. A mold may have any combination of the following factors.

ALLERGENS

Virtually any mold species can cause allergies in a sensitive individual. In fact, a mold does not even have to be alive to remain allergenic.

Professionals involved in combating a mold problem must take this into account, since there often is a misconception that biocides alone can cure the problem.

PATHOGENS

Certain species of molds can be human pathogens. Pathogens, as opposed to allergens, must be alive to cause disease. Along with mold species that can infect skin, certain ones, especially species of *Aspergillus*, *Coccidioides*, *Cryptococcus*, *Histoplasma*, and *Candida* can grow inside an individual, causing disease. These diseases, or deep mycoses, generally are limited to individuals with compromised immune systems such as patients with autoimmune diseases like AIDs, or transplant recipients and cancer patients. There is increasing evidence that chronic sinusitis in non-immunocompromised individuals may be caused by any of more than 40 species of molds.

MYCOTOXINS

Mycotoxins are poisons made by certain species of molds. Awareness of the dangers of mycotoxins has been rising.

For example, in Ohio in 1994, a number of infants in flood-damaged homes con-



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EPA Planning Its Own Mold-Remediation Guidelines

The Environmental Protection Agency (EPA) announced that it will issue its own mold-remediation guidelines for schools and commercial buildings early this year.

"The EPA wants to provide the best mold-remediation practices currently available," Elissa Feldman, associate director for the agency's Indoor Environments Division, said. "The guidelines will describe how to scope out a mold problem, how to determine what its moisture sources are, and how to take a cautious approach to determine the extent of both problems."

Feldman added that the guidelines also will explain when building managers should call for professional help in mold remediation.

The agency will post the guidelines on its Website (www.epa.gov/iaq). Readers seeking information on mold can also call the EPA's Indoor-Air-Quality Information Hotline: 800-438-4318.

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tracted idiopathic pulmonary hemosiderosis (bleeding lungs). After some of the infants died, a Cleveland physician, Dr. Dorr Dearborn, suggested a relationship between the illnesses and the presence of *Stachybotrys chartarum* in the homes. This considerably raised public concern about the risk of indoor mold.

Some strains of this mold are known to produce potent mycotoxins, called trichothecenes. Other mycotoxins including aflatoxins, ochratoxins, sterigmatocystin, and others have been reported in contaminated environments. But, because the levels required to induce toxic effects in experimental animals are considerably higher than those found in contaminated indoor environments, the health risks posed by mycotoxins remain uncertain.

But, even disregarding the potential effects of mycotoxins, the fact remains that exposure to mold spores in indoor environments can and does pose a significant health hazard. The 1999 guideline¹ from the American Conference of Governmental Industrial Hygienists (ACGIH) provides an excellent review of bioaerosols, including molds and mycotoxins, and their health effects.

GUIDELINES

In response to the health concerns associated with mold exposures, a number of guidelines have been issued over the last decade. The first of these² were issued by the ACGIH in 1989. As mentioned above, the latest revision of these guidelines appeared in 1999.

In both documents, ACGIH was reluctant to assign strict numbers to the guidelines. Instead, they made general recommendations, with increasing containment and personal protection proportional to the extent of contamination as judged by a qualified professional.

Another guideline³ that dealt with molds in indoor air was published by Health Canada in 1993 and revised in

1995. The 1995 Health Canada recommendations are very similar to the 1993 New York City Dept. of Health guidelines.⁴ However, the Health Canada guidelines encompassed all molds, whereas the New York City guidelines were specifically written to address *S. chartarum*.

In April 2000, the New York City Dept. of Health guidelines⁵ (Table 1) were revised to include all molds that might colonize water-damaged building materials. On the other hand, the revision relaxed the area definitions for each containment level. For instance, the 1993 guidelines recommended full containment if there were 30 sq ft of contaminated building materials. The 2000 guidelines recommend full containment only when when the area of contamination exceeds 100 sq ft.

These guidelines should be considered only minimum recommendations. It is very likely that more stringent containment than prescribed in the guidelines (such as HEPA-filtered negative air) may be necessary to afford adequate protection to building occupants and remediation personnel. Factors that should be considered during containment-level design include:

- The fact that most molds can produce over a million spores per sq in. of growth on building materials. Therefore, containment and/or remediation methods must be adequate enough to either prevent spore aerosolization or the transport of spores to occupied areas of the building.

- Proximity of the contamination to occupied areas, especially areas with individuals at risk. Healthcare facilities or retirement communities with large populations of at-risk individuals require extra precautions and implementation of more stringent containment procedures.

- The perspective of the occupants in relation to potential health risks. In other words, an HVACR or remediation professional should take the trouble to inquire if exposed individuals already have voiced

concerns or developed symptoms.

- Last but not least, an assessment should be made as to the potential amount of legal liability that may be posed if building occupants, restoration/remediation personnel, and third parties are exposed to mold contamination during remediation efforts. The objective of such an assessment is not to engage, but rather to avert the involvement of attorneys.

REFERENCES

1) ACGIH. 1999. *Bioaerosols: assessment and control*. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

2) ACGIH. 1989. *Guidelines for assessment and sampling for saprophytic bioaerosols in the indoor environment*. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

3) EHD, Health Canada. 1995. *Fungal contamination in public buildings: A guide to recognition and management*. Environmental Health Directorate, Health Canada, Ottawa, Ontario, Canada.

4) New York City Dept. of Health. 1993. *Guidelines on assessment and remediation of Stachybotrys atra in indoor environments*. New York City Dept. of Health, New York, NY.

5) N.Y. City Dept. of Health. 2000. *Guidelines on assessment and remediation of fungi in indoor environments*. New York City Dept. of Health, New York, NY.

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Online Resources

- **American Conference of Governmental Industrial Hygienists (ACGIH):** www.acgih.org
- **American Industrial Hygiene Association (AIHA):** www.aiha.org
- **Health Canada, Health Directorate,** "Fungal Contamination in Buildings: A Guide to Recognition and Management": www.hcsc.gc.ca/ehp/ehd/catalogue/bch_pubs/fungal.pdf
- **New York City Dept. of Health,** "Guidelines on Assessment and Remediation of Fungi in Indoor Environments": www.ci.nyc.ny.us/html/doh/html/epi/mol_drpt1.html
- **Washington State Dept. of Health, Office of Environmental Health Assessments,** "Is Indoor Mold Contamination a Threat to Health?": www.doh.wa.gov/ehp/oehas/mold.html

DATA DIGEST

TABLE 1: SUMMARY OF THE 2000 NEW YORK DEPT. OF HEALTH MOLD REMEDIATION PROTOCOLS

Remediation Parameter	Level 1	Level 2	Level 3	Level 4	Level 5A	Level 5B
Description	Small isolated areas (10 sq ft or less)	Mid-sized isolated areas (10-30 sq ft)	Large isolated areas (30-100 sq ft)	Extensive (> 100 contiguous sq ft)	HVAC systems (< 10 sq ft)	HVAC systems (>10 sq ft)
Examples	Ceiling tiles, small areas on wall(s)	Individual wallboard panels	Several wallboard panels	Multiple wallboard panels	N/A	N/A
Minimum requirements for remediation oversight	Trained building staff	Trained building staff	Qualified health and safety professional	Qualified health and safety professional	Trained building staff	Qualified health and safety professional
OSHA regulatory standards	29CFR1910.1200 29CFR1910.134	29CFR1910.1200 29CFR1910.134	29CFR1910.1200 29CFR1910.134	29CFR1910.1200 29CFR1910.134	29CFR1910.1200 29CFR1910.134	29CFR1910.1200 29CFR1910.134
Respiratory protection	N95 disposable respirator	N95 disposable respirator	N95 disposable respirator	Full-face respirator w/ HEPA cartridges	N95 disposable respirator	Full-face respirator w/ HEPA cartridges
Gloves	Yes	Yes	Yes	Yes	Yes	Yes
Eye protection	Yes	Yes	Yes	Yes	Yes	Yes
Protective clothing	No	No	No	Yes	No	Yes
Area unoccupied during remediation	Yes	Yes	Yes	Yes	Yes	Yes
Evacuate adjacent areas	Recommended if area is occupied by at-risk groups*	Recommended if area is occupied by at-risk groups*	Yes	Recommended if area is occupied by at-risk groups*	Recommended if area is occupied by at-risk groups*	Recommended if area is occupied by at-risk groups*
Containment	None	Plastic barriers	Plastic barriers	Critical barriers, airlocks, decontamination room within the critical barrier	Plastic barriers	Plastic barriers. But if contamination >30 sq ft, critical barriers, airlocks, decontamination room within the critical barrier recommended
HEPA-filtered air scrubbers	No	No	No	Yes	No	Yes
Dust suppression	Water misting	Water misting	Water misting	Water misting	Water misting	Water misting
Disposal of contaminated materials	Wrap contaminated materials in plastic; dispose at landfill	Wrap contaminated materials in plastic; dispose at landfill	Wrap contaminated materials in plastic; dispose at landfill	Wrap contaminated materials in plastic; dispose at landfill	Wrap contaminated materials in plastic; dispose at landfill	Wrap contaminated materials in plastic; dispose at landfill
Post-remediation cleaning of work area and egress	Wipe with damp cloth and/or mop with a detergent solution	HEPA vacuum and wipe with damp cloth and/or mop with a detergent solution	HEPA vacuum and wipe with damp cloth and/or mop with a detergent solution	HEPA vacuum; wipe with damp cloth and/or mop with a detergent solution	HEPA vacuum; wipe with damp cloth and/or mop with a detergent solution	HEPA vacuum and wipe with damp cloth and/or mop with a detergent solution
Clearance testing requirement	None	None	None	Required	None	Required

*At-risk groups include infants less than 12 months of age; persons recovering from recent surgery; immuno-suppressed individuals, including transplant patients, patients undergoing chemotherapy, AIDS patients, and patients with autoimmune diseases; and individuals with chronic inflammatory lung disease (e.g., asthma, hypersensitive pneumonitis, or severe allergies).