

Molds, Toxic Molds, and Indoor Air Quality

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*Prepared at the Request of
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MARCH 2001

CRB Note. Vol. 8, No. 1

ISBN: 1-58703-133-7

Molds and Indoor Air Quality

Molds are essential components of our planet's ecosystem providing decomposition of many organic substances necessary to plant, animal, and human life. However, it is also the case that excessive exposure to molds has been a health issue for humans for many, many years. The earliest known writings that appear to discuss mold infestation and remediation (cleaning up, removal) are found in the Old Testament.¹ Molds have been implicated as the cause of a variety of health effects in humans ranging from minor allergic reactions and exacerbation of asthma, to brain damage. Molds have been found growing in private homes, office buildings, schools, automobiles, and other locations where organic matter and water are left unattended. This is not a new issue -- just one which, until now, has received little attention by policy makers in the United States.

There are no state or federal statutes or regulations regarding molds and indoor air quality. However, some public agencies do make various publications regarding mold and indoor air quality available to the public. The majority of the publications available regarding mold and indoor air quality focus on commercial and school building infestation and remediation. However, there are a few publications available which are geared specifically toward the general public and residential exposure.

The key to limiting mold exposure is to prevent the germination and growth of mold. Individuals, landlords, building maintenance personnel, architects, and builders need to know effective means of avoiding mold growth which might arise from lifestyle choices or maintenance and construction practices. Likewise, effective means of locating and cleaning existing growths are paramount to decreasing the health effects of mold contamination.

This paper was prepared at the request of Assemblymember Alan Lowenthal and provides background information on molds, their potential health effects, and how they relate to indoor air quality.

WHAT TYPE OF ORGANISM IS MOLD?

Molds are the most typical form of fungus found on earth, comprising approximately 25% of the earth's biomass.² Other fungi include yeasts and mushrooms. Molds are ubiquitous on our planet and are essential decomposers of organic substances necessary for sustaining plant and animal life.³ Molds are made up of masses of filament-like cells called *hyphae*. Under the appropriate conditions, the *hyphae* will grow into long intertwining strings that form the main body of the fungus, or the *mycelium*. It is the

mass of mycelium that is visible to the human eye. Molds reproduce via spores. However, molds can also spread if a fragment of broken *hyphae* is transplanted to an area with adequate moisture and organic matter for food.⁴

What causes mold to grow? Molds are incredibly resilient and adaptable. Molds gain the nutrients they need through the decomposition of organic matter. Most molds found in indoor air are saprotrophic, meaning they gather their food from dead moist organic matter such as wood, paper, paint, fabric, plant soil, dust, and cooked or raw foods. However, molds can also grow on the surface of damp inorganic matter such as glass and bare concrete covered by an invisible *biofilm* (an extremely thin layer of organic matter).⁵

In short, all mold needs to germinate and grow is a readily available food source, undisturbed water, and time. Some molds can germinate in as little as four to 12 hours.⁶ Left undisturbed, mold can grow and spread in 24 to 72 hours.⁷

In their paper on health effects of molds, Peter Kozak, et al state, “Endogenous mold problems generally occur after prolonged or repeated water damage to a variety of organic materials.” They further explain that mold spores can be brought into the home from outside. Outdoor factors that seem to affect indoor mold spore concentrations include marked shade, increased levels of available organic debris, and “natural or basically uncared for property.”⁸

Floods, leaking pipes, leaking windows, and leaking roofs are all potential sources of moisture that can lead to mold infestation. Increased ambient humidity as a result of inadequate ventilation or improper drying of flooded areas can also lead to mold growth. Lifestyle choices such as overpopulating a residence, keeping a house closed up without running an air conditioner or dehumidifier, the presence of multiple indoor houseplants (especially if over watered and without adequate ventilation), and poor housecleaning habits can also lead to mold growth.⁹

What are the reproductive properties of molds? Molds reproduce through the production of spores. The environment in which a given mold may grow prolifically is very likely different from the environment necessary for spore production.¹⁰ After the spores are formed they are released into the air to be carried elsewhere for germination and growth. Mold spores can survive for many years in dry or hot environments, requiring only moisture and available organic matter to allow them to germinate.¹¹

WHAT ARE “TOXIC” MOLDS?

Journalists have used the term “toxic mold” when writing about molds that have been implicated in severe health reactions in humans. As used in the press, this term generally refers only to those molds capable of producing *mycotoxins*. (A detailed description of fungal properties, including the production of mycotoxins is included in the next section of this paper.) However, all molds under proper conditions are capable of eliciting a negative health response in humans through other methods such as inflammation, allergy,

or infection.¹² Therefore, limiting the discussion to just those molds that potentially produce mycotoxins is inappropriate.

PROPERTIES OF MOLDS WHICH POTENTIALLY POSE A THREAT TO HUMAN HEALTH

Molds can elicit a variety of health responses in humans. The severity of the impact depends upon the type and amount of mold present as well as the susceptibility and sensitivity of the individual experiencing mold exposure.¹³ Humans are exposed to molds via ingestion, inhalation, and skin contact with mold or mold infested material.¹⁴ Although molds are living, multiplying organisms, they do not have to be alive to cause adverse health effects.¹⁵

Below is a list of mold components known to elicit a response in humans. Selected health effects of mold exposure are discussed in a later section of this paper.

Volatile Organic Compounds. In the paper “Fungi & Indoor Air Quality” Sandra McNeel and R. Kreutzer state that “[m]olds produce a large number of volatile organic compounds. These chemicals are responsible for the musty odors produced by growing molds.”¹⁶ Volatile organic compounds also provide the odor in cheese, and the “off” taste of mold infested foods. Exposure to high levels of volatile organic compounds, from any source, such as industrial work places, can irritate the mucous membranes and affect the central nervous system, producing such symptoms as headaches, attention deficit, inability to concentrate, and dizziness.¹⁷

According to McNeel, at present the specific contribution of mold volatile organic compounds to building-related health problems has not been studied. Also, mold volatile organic compounds are likely responsible for only a small fraction of total volatile organic compounds indoors.¹⁸

Allergens. Due to the presence of allergens on spores, all molds studied to date have the potential to cause an allergic reaction in susceptible humans.¹⁹ Allergic reactions are believed to be the most common exposure reaction to molds. These reactions can range from mild, transitory responses, like runny eyes, runny nose, throat irritation, coughing, and sneezing; to severe, chronic illnesses such as sinusitis and asthma.²⁰

Mycotoxins. Some molds are capable of producing *mycotoxins*, natural organic compounds that are capable of initiating a toxic response in vertebrates.²¹ Molds known to potentially produce mycotoxins and which have been isolated in infestations causing adverse health effects include certain species of *Acremonium*, *Alternaria*, *Aspergillus*,

*Chaetomium, Cladosporium, Fusarium, Paecilomyces, Penicillium, Stachybotrys, and Trichoderma.*²² This list is not all-inclusive.*

While a certain type of mold or mold strain type may have the genetic *potential* for producing mycotoxins, *specific environmental conditions* are believed to be needed for the mycotoxins to be produced. In other words, although a given mold might have the potential to produce mycotoxins, it will not produce them if the appropriate environmental conditions are not present. Currently, the specific conditions that cause mycotoxin production are not fully understood. The United States Environmental Protection Agency (U.S. EPA) recognizes that mycotoxins have a tendency to concentrate in fungal spores and that there is limited information currently available regarding the processes involved in fungal spore release. As a result, the agency is currently conducting research on *Stachybotrys chartarum* in an effort to determine “the environmental conditions required for sporulation, emission, aerosolization, dissemination and transport of [*Stachybotrys*] into the air.”²³

POTENTIAL HEALTH EFFECTS OF MOLDS

Certain health effects, such as those related to allergic reactions like irritation of the eyes, nose, and throat, dermatitis, exacerbation of asthma, and respiratory distress, have been proven to be associated with mold exposure. Other reported effects such as fever, flu-like symptoms, fatigue, respiratory dysfunction (including coughing up blood), excessive and regular nose bleeds, dizziness, headaches, diarrhea, vomiting, liver damage, and impaired or altered immune function have been identified in persons who have been exposed to mold via inhalation, however, limitations in existing science hinder the ability of researchers to conclusively cite mold exposure as the cause of these health effects. Similarly, while kidney damage, infertility, reproductive cycle disruption, and neurotoxicity have been reported in animals exposed to molds under laboratory conditions, no evidence of these effects has been noted in humans.²⁴

The extent to which an individual may be affected depends upon his or her state of health, susceptibility to disease, the organism with which he or she came in contact, and the duration and severity of exposure.²⁵ Some people experience temporary effects that disappear when they vacate infested areas.²⁶ In others, the effects of exposure may be long-term or permanent.²⁷ Selected incidence of injury related to mold exposure will be discussed in a later section of this paper.

* The University of Minnesota Department of Environmental Health and Safety has compiled a glossary of common fungi and their allergenic/toxic potential. The list is currently available on the internet at <http://www.dehs.umn.edu/iaq/fungus/glossary.html>.

Systemic infections caused by molds are not common.²⁸ Normal, healthy individuals can resist systemic infection from airborne molds. Those at risk for systemic fungal infection are severely immunocompromised individuals such as those undergoing chemotherapy, individuals who have had organ or bone marrow transplants, and persons with HIV/AIDS.²⁹

A National Academy of Sciences report titled *Clearing the Air: Asthma and Indoor Air Exposures* determined there was sufficient evidence to show an association between mold exposure and the *aggravation* of asthma in individuals who are sensitized to the disease. However, researchers report inadequate or insufficient evidence to determine whether or not an association exists regarding mold exposure and the *development* of asthma.³⁰

An outbreak of *Stachybotrys chartarum* in Cleveland, Ohio, in 1994 was believed by some to have caused pulmonary hemorrhage in infants. Sixteen of the infants died. A Center for Disease Control sponsored a review of the cases concluded that the scientific evidence provided did not warrant the conclusion that inhaled mold was the cause of the illnesses in the infants. However, the panel also stated that further research was warranted, as the study design for the original research appeared to be faulty.³¹

CHALLENGES WITH REGARD TO SETTING EXPOSURE LIMITS

Unfortunately, due to the variances in personal sensitivities and the vast array of molds (by some estimates over 100,000) it has been impossible to set exposure limits for molds that can be applied to all humans.

Research regarding exposure limits and the effects of *ingested* molds is readily available. However, due to the limitations of currently available science, few studies exist regarding the exposure limits and effects of *inhaled* molds on individuals.³² This is due primarily to the absence of biomarkers specific to molds. Biomarkers are chemicals in the body which have a particular molecular feature that make it possible to measure if an individual has been exposed to disease causing organisms as well as the progress of disease or the effects of treatment. At present time there are no known biomarkers that can prove that an individual has been exposed to molds. Therefore, traditional means of proving the correlation between exposure and symptoms is impossible. The lack of biomarkers limits our ability to genuinely link indoor mold exposure to specific illnesses. New York City Department of Health Guidelines explain: “[S]usceptibility varies with the genetic predisposition, age, state of health, and concurrent exposures. For this reason, and because measurements of exposure are not standardized and biological markers of exposure are largely unknown, it is not possible to determine ‘safe’ or ‘unsafe’ levels of exposure for people in general.”³³

Regarding infant exposure, the American Academy of Pediatrics Committee on Environmental Health in April 1998 stated that physicians should make every effort to ensure that infants less than one year of age avoid chronically moldy, water-damaged environments.³⁴

Several population-based studies make the correlation between mold exposure via inhalation and health effects. A comprehensive review of available literature relating to the health effects of mold performed by the Federal-Provincial Working Group on Mycology Air Quality in Public Buildings (a Canadian Government sponsored group) showed that such studies “have consistently detected an association between respiratory symptoms and home dampness and mould growth, but causality in these studies has not been established. Until the magnitude of population risk is known, it would be prudent, based on current evidence, to remediate indoor sources conducive to fungal growth.”³⁵

All resources reviewed agree that those most at risk for adverse health effects related to mold exposure are infants, the elderly, the chronically ill, severely immunocompromised individuals such as those undergoing chemotherapy, individuals who have had organ or bone marrow transplants, and persons with HIV/AIDS.

TOXIC MOLDS AS AN INDOOR AIR QUALITY ISSUE

While there are no state or federal statutes or regulations regarding mold exposure and indoor air quality, molds are increasingly being suspected as the cause of a variety of illnesses related to inhalation exposure.

McNeel and Kreutzer explain that in the 1970s and 1980s mold contamination was identified as the primary cause for poor air quality in only 5% of more than 500 National Institute for Occupational Safety and Health (NIOSH) indoor air quality investigations. From 1986 to 1996, however, molds were the primary source of contamination 35-50% of the time. They note, “This change has been attributed at least partially to a paradigm shift from chemical contaminant-based investigations to an interdisciplinary approach combining evaluation of physical, chemical and microbial constituents of indoor air environments.”³⁶ In other words, until recently, we didn’t look for molds.

According to Chris Gerber, an environmental consultant with nationally recognized testing and consulting firm Restoration Consultants, 70-80% of mold problems investigated by his employer in the past five to seven years have been in newly constructed buildings and newly constructed residences. Mr. Gerber attributes this high incidence of growth primarily to poor construction practices, the use of substandard materials, and increased air tightness of new construction techniques. He explains that increased air-tightness of newly constructed residences and office buildings can allow moisture to become trapped in exterior walls, creating an environment conducive to mold growth. Gerber further explains that in buildings with mold problems, centralized heating and air-conditioning systems can pick up contaminants and recirculate them throughout the building thus potentially spreading the infestation.³⁷

Jed Waldman, Chief of the California Department of Health Services Indoor Air Quality Program, suggests that regardless of construction practices, certain climate related events, such as flooding and the La Niña experienced two years ago (which left most of

California very cold and very wet), can cause even the most carefully constructed building to support mold growth.³⁸

With regard to indoor air quality, molds have been implicated in office buildings, schools, and residences as contributing to the cause of illness in humans:

- **Sick Building Syndrome (SBS):** Although not attributed exclusively to molds, this is a term “used to describe situations in which building occupants experience acute health and comfort effects that appear to be linked to time spent in a building” because all other probable causes have been ruled out.³⁹ Symptoms include headaches; eye, nose, and throat irritation; dry cough; dry or itchy skin; dizziness and nausea; difficulty in concentrating; fatigue; and sensitivity to odors.⁴⁰

Sick building syndrome is attributed to inadequate ventilation, chemical contaminants from indoor and outdoor sources, and biological contaminants such as molds, bacteria, pollens, and viruses.⁴¹

In the paper, *Sick-Building Syndrome and Building Related Illnesses*, Theodore Passon, James W. Brown, and Seth Mante explain how increased air tightness of buildings in the 1970s, as a means of reducing energy consumption, has created environmental conditions conducive to the “proliferation of microorganisms [including mold] in indoor environments.”⁴² Once growth has occurred, harmful organisms can be spread by improperly designed and maintained ventilation systems.⁴³

- **Poor Indoor Air Quality in Schools:** A 1998 survey of literature published on indoor air quality, ventilation and health symptoms in schools performed by Lawrence Berkeley National Laboratory states that health problems in schools related to indoor air quality are very similar to those symptoms reportedly experienced as sick building syndrome. The survey also revealed that microbiological pollutants, along with volatile organic compounds, CO, and CO₂, were some of the most commonly measured air pollutants in schools, adding that fungal spores, bacteria, and allergens may be of particular concern. The survey cites water damage leading to mold contamination as the second most frequently reported building-related problem.⁴⁴

The United States government’s General Accounting Office reports that nationwide one in five schools reports having indoor air quality problems.⁴⁵ Consequences of poor indoor air quality in schools include: increasing risk of long and short-term health problems in teachers and students; a negative impact on students’ ability to learn due to physical symptoms; reduced productivity of teachers; destruction of school equipment, including text books; and negative publicity for the school resulting in strained relationships among teachers, parents, and administrators.⁴⁶

- **Illness related to residential exposure:** Molds are believed to be one possible cause of certain severe adverse health impacts in children and adults in their homes. A few extreme examples include:
 1. A Foresthill, California, couple, after realizing remediation was too expensive, recently burned their home to the ground. The family claims that exposure to mold infestation caused respiratory problems, nose bleeds, rashes, and other illnesses in family members.⁴⁷ They believe, in their case, that rebuilding is less costly than remediation.
 2. Residents of four low-income housing apartment complexes in the Hunters Point section of San Francisco, California, blame toxic molds for a myriad of illnesses including rashes, hacking coughs, respiratory problems, headaches, nosebleeds, and high blood pressure.⁴⁸ Similar claims have occurred in other complexes statewide.
 3. A Dripping Springs, Texas, couple's 11,500 square-foot home was quarantined after molds were alleged to have caused stomach problems, diarrhea, vomiting, severe respiratory scarring, and other maladies in their son, as well as severe memory loss in the husband, ultimately resulting in his inability to work.⁴⁹

Is climate an issue? While molds are commonly thought to grow only in warm, moist, dark environments, recent research has shown that mold can grow even in dry climates. Since 1991, the U.S. EPA has been conducting research to determine what environmental conditions permit mold infestation. The focus of the investigation has been on material properties, climate conditions, and microorganism interactions. According to the executive summary, "One of the most significant technical results from this project is that the effect of relative humidity is indirect and that very small amounts of moisture, well below those commonly cited, will permit growth."⁵⁰ Therefore, while dry climates may experience a reduced incidence of mold growth, they are not immune to infestation.

ACTION BY STATE AND FEDERAL AGENCIES

There are no mandated actions specific to molds and indoor air quality required by any state or federal agencies. The U.S. EPA Indoor Air Quality website states, "Standards or Threshold Limit Values (TLVs) for airborne concentrations of mold, or mold spores, have not been set. Currently, there are no EPA regulations or standards for airborne mold contaminants."⁵¹

However, no mandates does not mean no action. In response to public concern, some state and federal agencies have made available a variety of documents related to mold and indoor air quality. The majority of these publications focus on commercial building and school building infestation and remediation. However, there are a few publications available which are geared specifically toward the general public and residential exposure.⁵²

Every attempt was made to ensure that this list is all inclusive, however, it is possible that at the time of publication some documents may not have been discovered.

California State Government. In response to increasing queries with regard to mold toxicity, the California Department of Health Services Indoor Air Quality Program has developed a website that includes a variety of documents related to this issue. Included in the selection is a document specific to residential exposure titled *Mold In My Home: What Do I Do?* These documents are currently available on-line at <http://www.cal-iaq.org>.

The Occupational Health Branch of California Department of Health Services (OHB) is mandated to review new and emerging occupational hazards and propose new regulations to the California Division of Occupational Safety and Health (Cal OSHA). As a result of a proposal by the OHB, Cal OSHA is looking at adding molds to the sanitation standard for office buildings and workspaces. OHB has created a “Molds in the Indoor Workplace” handout which addresses these concerns. The handout is currently available on-line at <http://www.dhs.ca.gov/ohb/HESIS/molds.pdf>.⁵³

Federal Government. The U.S. EPA has published recommendations on the cleanup of mold and control of moisture as part of its informational package titled “IAQ Tools for Schools.”⁵⁴ Federal guidelines regarding mold remediation are anticipated in a subsequent publication, “Mold Remediation in Schools and Commercial Buildings.” EPA staff states that the guidelines are practical and thorough and focus on commercial buildings (including multi-family dwellings) and schools. Staff also asserts that the guidelines have applicability to residential infestation as the underlying principles for remediation are the same. The document is anticipated to be available online at the U.S. EPA website by the third week in March 2001.⁵⁵

Federal OSHA refers to molds as a potential indoor air quality concern in the OSHA Technical Manual, Section III, Chapter 2. This document suggests guidelines to employers on how to respond to employee complaints regarding indoor air quality, including recommendations for increasing indoor air quality and removal of offending organisms. Molds are one of several air contaminants mentioned as possible causes of building-related illnesses. According to Ira Wainless, an industrial hygienist with OSHA, there are no plans for further action with regard to mold as an indoor air contaminant at this time.⁵⁶

Nationwide, other state and local governments. Several state and local agencies and universities across the United States have begun to address the issue of mold as an indoor air contaminant through the publication of articles and informational pamphlets discussing health effects, prevention, and remediation of indoor molds. Nationwide, agencies and universities offering informational materials include: Kansas Department of Health and Environment; Kansas State University; Minnesota Department of Health; Montana State University; New Jersey Department of Health and Senior Services, Public Employees Occupational Safety and Health Program; New York City Department of Health, Bureau of Environmental & Occupational Disease Epidemiology; North Carolina

State University; Texas Department of Health; and Washington State Department of Health.

The Canadian government has also conducted research regarding mold and indoor air quality.

Why are molds not on the Proposition 65 list of chemical contaminants? Proposition 65 requires that the Governor publish a list of chemicals that are known to the State of California to cause birth defects, reproductive harm, or cancer. Given that toxic molds are not classified as chemicals, they do not currently qualify for inclusion on the list.

WHAT TO DO WHEN MOLDS ARE DISCOVERED: TESTING AND REMEDIATION

Molds are resilient organisms. Because molds are capable of permeating porous materials surface cleaning is often insufficient to eradicate mold colonies. Also, because dead molds can damage human health, complete removal of all mold is required.

Is testing to determine toxicity warranted? In a word, no. According to Harriett Ammann, a Senior Toxicologist for the Washington State Department of Health, “While testing for toxins is useful for establishing [the cause] of disease, and adds to knowledge about mold toxicity in the indoor environment, prudent public health practice might advise speedy clean-up, or removal of heavily exposed populations from exposure as a first resort.”⁵⁷

Further, according to John Banta, of Restoration Consultants, testing for mycotoxins that may be present in indoor air or structures is still experimental and not routinely offered.⁵⁸ Banta and Gerber explain that most testing routinely performed at sites of infestation focuses on determining the type and quantity of mold present at the main site of mold infestation. This information is then used to determine to what extent the mold may have migrated throughout the building in an effort to reveal other, as yet not visible, locations of contamination.⁵⁹

Knowing the type of mold present or whether it produces toxins is not necessary to determine the appropriate method for clean up. Testing for type and quantity of molds is useful primarily when litigation is imminent (or in process), or in cases of severe health effects (for example, when physicians are trying to isolate an offending organism).⁶⁰

Unnecessary testing is also cost prohibitive. Determination of toxicity and differentiation of various mold strains requires expert testing. There is currently no home test for the layperson that will identify mycotoxin-producing molds. This is due primarily to the vast variety of molds that have multiple identity strains of which only some can potentially produce mycotoxins.⁶¹ According to Chris Gerber, of Restoration Consultants, a basic investigation for a single-family dwelling can start at \$1,000 to \$1,500. Testing in an attempt to document fault (for example, for use in determining financial responsibility in litigation) can increase the cost to \$2,000 or more.⁶²

As previously discussed, molds are capable of eliciting a variety of adverse health effects. These effects are not limited only to exposure of mycotoxins, but are due to exposure of other fungal properties as well. Therefore, it is generally agreed that regardless of the type of mold present, any visible mold should be removed. Given the risks of large amounts of visible mold in cases of extreme growth, if testing is desired, remediation should not be postponed until all test results are complete unless the building is to be unoccupied and dehumidified in the interim.

No State or Federal entities currently offer testing services of mold samples for mycotoxin production.

How is mold remediated? No State or Federal statutes or regulations exist with regard to removing mold.

The New York City Department of Health was the first government entity to produce guidelines on mold. The document, "Guidelines on Assessment and Remediation of Fungi in Indoor Environments," has been cited by many as useful in planning mold cleanup procedures primarily because it was the only document available. However, some believe that the New York City guidelines are too arbitrary and focus too much on the size of visible mold when determining appropriate cleanup methods. For example, Jim Holland, of Remediation Consultants, states that the New York City guidelines do not take into consideration hidden molds which may be revealed when walls are opened. Thus, he claims, the guidelines can actually increase the risk of spreading the mold throughout the building as they do not require containment of small areas of infestation during the cleanup process.

Recommendations regarding mold remediation in commercial and school buildings are offered by a variety of federal, state, and private organizations and are not standardized. The soon-to-be-available U.S. EPA guidelines are widely anticipated and many hope they will clear the air with regard to differing schools of thought regarding mold cleanup in commercial and school buildings. However, there are certain aspects of mold cleanup which are agreed upon by all.

- Persons with respiratory problems, a compromised immune system, or fragile health, should not participate in cleanup operations.
- The source of moisture must be stopped and all areas infested with mold thoroughly cleaned. If thorough cleaning is not possible due to the nature of the material (porous versus semi- and non-porous), all contaminated areas should be removed.⁶³
- Cleanup crews should be properly attired. Mold should not be allowed to touch bare skin. Eyes and lungs should be protected from aerosol exposure.
- All efforts should be made to contain the infestation, while still allowing adequate ventilation for the cleanup crew during the cleanup process, in an effort to avoid spreading mold to other areas.

Experts consulted agree that a common sense approach should be taken when assessing mold growth. For example, it is generally believed that small amounts of growth, like those commonly found on shower walls, pose no immediate health risk to most individuals.

The California Department of Health Services information sheet, “Mold in My Home: What Do I Do?” contains guidelines for cleanup of large areas of mold that mirror those for commercial buildings and schools: persons with fragile health should not be involved in mold cleanup, wear protective gear, keep the area of infestation isolated, and maintain adequate ventilation for cleanup crew in area being cleaned. Residents are also cautioned to work over short time spans with rest periods in locations with access to fresh air, and to air out their home well after cleanup. This document also encourages residents to start the cleanup process with a small test patch. If the resident experiences any adverse health effects while cleaning the test area, it is advised that they consider hiring a professional to complete the job.⁶⁴

Do insurance policies cover the remediation of mold infestation and subsequent structural repairs? Unless the infestation can be linked to an insurable event, the costs of testing and remediation fall on the property owner.

Some insurance companies will cover remediation if the precipitating event is considered insurable under the terms of the policy purchased by the property owner. Reading and understanding the coverage that is available under any given policy is advised. Because policy language can be difficult to interpret, in order to truly understand the coverage offered under their policy property owners should consult with an attorney specializing in insurance litigation.⁶⁵

Precipitating events that may be considered insurable include water accumulation as a result of sudden and accidental flooding, wind-driven rain, fire damage, and sewer back-up.⁶⁶ Specific covered events are detailed in the homeowner’s policy.

According to an article in the August 2000 issue of *Claims* magazine “Some of these losses are covered, some are not. If the water damage is the result of a covered loss, the resultant damage, mold (including fungi, mildew, etc), is probably also covered.”⁶⁷ In order to avoid paying for remediation of pre-existing mold this article urges adjusters to make a site visit within the first 24 to 72 hours, stating that any molds visible in the first two days post flooding are pre-existing and therefore not covered under the claim of loss.

Litigation to determine responsibility is not uncommon. Lawsuits have been filed against former property owners, builder’s and insurance companies. Mealey’s, a nationally recognized source for litigation information, released a publication in June 2000 which reports on 25 cases from around the country, with references to 29 available complaints, motions, and decisions in the field.⁶⁸ These 25 cases represent only a small portion of what is believed, by one account, to be thousands of mold related cases nationwide.⁶⁹ Litigation related to mold was the topic of a recent two-day conference in Philadelphia. Other similar conferences are planned across the country over the coming months.⁷⁰

HAZARD REDUCTION – PREVENTION OF ABNORMAL GROWTH IS KEY

All molds under proper conditions and concentrations are capable of adversely affecting human health. Therefore, it is clear, that reduction and prevention of mold exposure is needed to decrease the risk of damage to human health. Small amounts of mold are always present in the air, the key to decreasing adverse health affects from mold exposure is to prevent the germination and growth of mold on indoor surfaces. Individuals, landlords, building maintenance personnel, architects and builders need to know effective means of avoiding mold growth which might arise from lifestyle choices or maintenance and construction practices. Likewise, effective means of locating and remediating existing mold growths are paramount to decreasing the health affects of mold contamination.

All agree, the first step in preventing mold growth is to remove the source of moisture. Stopping leaks, decreasing indoor air humidity, and proper cleanup of waters after flooding are key to stopping the germination and growth of molds.⁷¹

In the meantime it is clear that once mold growth has occurred, fixing underlying leaks and immediate remediation of growth using proper techniques are required to avoid potential damage to health.

Notes

¹ Leviticus, Chapter 14.

² Sandra Mc Neel and R. Kreutzer, “Fungi & Indoor Air Quality” *Health & Environment Digest* Vol 10, No. 2, (May/June 1996), 9-12. Posted online at: http://www.dhs.cahwnet.gov/org/ps/deodc/ehib/EHIB2/topics/fungi_indoor.html.

³ Harriet Ammann, “Is Indoor Mold Contamination a Threat?” Washington State Department of Health. Accessed February 6, 2001. Posted at: <http://www.doh.wa.gov/ehp/oehas/mold.html>.

⁴ Gerald Tortora, Berdell Funke, and Christine Case. *Microbiology, An Introduction*; Fourth Edition. (Redwood City: Benjamin/Cummings, 1992), 297-299.

⁵ Mc Neel and Kreutzer, “Fungi & Indoor Air Quality;” Dr. Eckhardt Johannig, “Hazardous Molds in Homes and Offices: Stachybotrys atra and others...” The EnviroVillage Papers. Accessed February 6, 2001. Posted at: <http://www.envirovillage.com/papers/R0000100002.htm>. Jim Holland, Certified Restorer and CEO of Restoration Consultants, a nationally recognized home and office indoor environmental testing and consulting firm, personal communication, discussion topics: Mold growth, identification, clean up and prevention.

⁶ Holland, personal communication.

⁷ Everette L. Herndon, Chin S. Yang. "Mold & Mildew: A Creeping Catastrophe" In: Claims Magazine on-line, August 2000 edition. Accessed February 6, 2001. Posted at: <http://www.claimsmag.com/issues/aug00/mold.asp>.

⁸ Peter P. Kozak, Jr., Janet Gallup, Leo H. Cummins, and Sherwin A. Gillman, "Endogenous Mold Exposure: Environmental Risk to Atopic and Nonatopic Patients," in R.V. Gammage and S.V. Kay, eds., *Indoor air & Human Health*, (Chelsea, MI: Lewis, 1985), 149-167.

⁹ Sandra McNeel, Scientist, CA Department of Health Services, Environmental Health Investigations Branch, personal communication, discussion topics: mold growth prevalence, exposure routes, testing, remediation, human biomonitoring, causes and prevention of toxic molds. Jed Waldman, Chief, CA Department of Health Services, Indoor Air Quality Program, personal communication, discussion topics: mold growth prevalence, insurance coverage, regulatory/statutory oversight, cause, and prevention of toxic molds. California Department of Health Services "Mold in my Home: What Do I Do?" Fact sheet dated March 1998. Accessed January 25, 200. Posted at <http://www.cal-iaq.org/mold9803.pdf>.

¹⁰ Mc Neel and Kreutzer, "Fungi & Indoor Air Quality."

¹¹ Tortora, Funke, Case, *Microbiology*.

¹² Mc Neel and Kreutzer, "Fungi & Indoor Air Quality."

¹³ Ammann, "Is Indoor Mold Contamination a Threat?"

¹⁴ Mc Neel and Kreutzer, "Fungi & Indoor Air Quality," Ammann, "Is Indoor Mold Contamination a Threat?"

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⁵⁹ Banta and Gerber, Personal communications.

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⁶³ Porous materials include things such as fabrics, drywall, and plaster. Materials considered to be semi-porous are those like wood and concrete. Non-porous materials are substances such as metal, glass, and hard plastics.

⁶⁴ California Department of Health Services "Mold in my Home: What Do I Do?"

⁶⁵ Tim Chang, California State Automobile Association, personal communication, discussion topics: Basic ISO homeowners policies and the methods used for defining coverage. Karen Kahn, attorney specializing in mold litigation, personal communication, discussion topics: Mold related litigation and insurance coverage. Dan King, attorney specializing in mold litigation, personal communication, discussion topics: Mold related litigation and insurance coverage.

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