



# ALABAMA MUNICIPAL INSURANCE CORPORATION MUNICIPAL WORKERS COMPENSATION FUND, INC.



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## *Loss Control Division*

### **I. The Science of Mold**

#### **A. What Causes Mold**

Molds are plants, a type of fungi. Molds, which include commonly recognized plants such as mushrooms, yeast and mildew, generally are small plants, but most species are easily visible with the naked eye. The molds are simple plants comprised of one or a relatively few cells. Unlike most plants, molds lack chlorophyll and cannot synthesize their food from the energy of the sun. Thus, molds must get their food from an external source which may include almost all man-made or natural surfaces. Some species obtain the organic nutrients by living as pathogenic parasites on other living plants. When the host plant is one we value as a cultivated food plant or ornamental, we call it a plant disease. Examples include the “rust” diseases of ornamentals and grain crops, powdery mildew on ornamentals or garden plants, apple and peach scab or the various species of smut that live on grasses. Other species of molds which live on dead and decaying organic material are categorized as “saprophytes.” I suspect all of us have seen the molds that grow on old bread or overripe fruit in the kitchen. Other species grow and develop on man-made things ranging from leather, cloth, lumber, sheetrock, wallpaper or insulation.

Aside from a food source, the other element that must be present is water. Without favorable moisture, molds will not develop. Standing or free water is not required. The

requirement for moisture varies among species, but if the relative humidity of the environment is 50% or more, there will be adequate moisture for some mold species to germinate and develop. In general, however, for molds to thrive and develop in large colonies, a very humid, moist environment is necessary. If food and moisture are favorable, molds do best in a warm environment when the temperatures exceed 75 degrees F., but most species will develop so long as the temperature does not go below 40 degrees F. or exceed 110 degrees F. During periods of unfavorable conditions, molds will not reproduce and grow, but they may survive in a dormant phase for an extended period of time. In fact, spores from desiccated media thousands of years old have been found to be still viable when exposed to water.

Although generally small in size with few cells, molds are complex plants. The vegetative bodies of the molds are microscopic filaments which may vary from colorless to red, black or green and everything in between. Considered individually, these vegetative filaments are called hyphae, but together they form what is called mycelium. The mycelium growth, which may appear as varied as a tangle of hairlike strands to a velvety or powdery surface, is what we generally see as the visible manifestation of a mold population.

Many species of mold, and essentially all of the species of medical importance to us, reproduce asexually by production of spores. The spores, which are microscopic in size and serve the same function as seeds in higher plants, are produced on the mycelium of the mold. The spores of some species are colorless, but for other species the spores may vary from a lightly tinted color to black. Some spores are extremely fragile and killed by exposure to dry air in minutes, but for other species the spores can survive after exposure to boiling water. Being microscopic in size, spores become airborne quite easily and can be dispersed over long distances by air currents.

One of the characteristics of molds that make them of interest to us from a health perspective is the number of spores that may be produced by a mold colony. Even a relatively small colony of mold may produce a huge number of spores, numbering in the trillions or more, in a short time. The result of this astonishing reproductive capacity of molds is that the air we breathe may be charged with mold spores where a significant mold contamination occurs in a closed space with little fresh air circulation. This may be true whether you are in the city or country. In most situations, the concentration of mold spores in a volume of air is not enough to create a problem, but in other situations, where there is a particularly large population of certain species of molds in a confined space with little fresh air circulation, the spores may create a threat to the health of some sensitive individuals.

## **B. Different Types of Mold**

There are more than 200,000 different species of molds in the world, with several thousand of these species found in the United States. Most species are innocuous and many are beneficial. For example, most of us know that penicillin, one of the first and still a commonly used antibiotic, is produced from cultures of molds that belong to the common bread mold group. Another benefit we derive from molds is in cheese production where the flavor and odor of cheese is a byproduct of the specific molds involved. Yeast, of course, has been important for baked goods for who knows how long. But, there are a few species, probably less than 200 throughout the world, which can pose a health threat to humans or animals. Under certain conditions, these few species can cause or worsen conditions such as allergies, asthma, hay fever, and respiratory problems. In a small number of susceptible people, more serious health effects can occur if cases of significant exposure. It is these relatively few species that have given rise to concerns of adverse health effects.

### **C. Causes of the Problem**

Humans and animals become exposed to mold spores or fragments of the vegetative part of the plant, i.e., the hyphae and mycelium, through inhalation, skin contact, or ingestion. The health effects from these exposures generally fall into four categories: (1) Allergic reactions, (2) infection of mucous membranes, (3) irritation of sensory organs, particularly the eyes, and (4) toxicity.

The most common response in humans to molds of concern is an allergic reaction. People who are genetically predisposed to allergies may develop symptoms of allergy when their respiratory system or skin are exposed to mold or mold products to which they have become sensitized. The allergic reaction may range from mild, transitory responses, to severe, chronic illnesses. It has been estimated that 20% of Americans suffer from allergic rhinitis, the single most common chronic disease experienced by humans. It is also estimated that about 14% of the population suffers from allergy-related sinusitis, another 10-12% have allergically-related asthma, and another 9% experience allergic dermatitis. A much smaller number, less than 1%, suffer the more serious infectious diseases of allergic bronchopulmonary aspergillosis or hypersensitivity pneumonitis. Exposure to molds is thought to be a cause for all of these ailments.

At the outset, we must recognize that molds are not the only source of the allergens that cause these health problems. In our day to day existence, most of us are exposed to a large number of things that can cause the same sort of allergic reactions blamed on mold. For example, in the home, humans are commonly exposed to dander from pets or vermin, droppings and other detritus from ants, cockroaches and other pests, dust mites, volatile organic compounds

(VOCs) that are commonly found in carpet, carpet padding and the adhesives used with carpet. All of these things, as well as a number of other items, can cause allergic reactions that are very difficult to distinguish from the reactions to mold. Only specialized tests by an allergist can identify whether a person is allergic to mold. However, even if one has reason to suspect a mold-related reaction, experts often warn that it is difficult, at best, to identify mold as a causative effect for an allergic reaction.

Generally, to establish an individual's allergic sensitivity, a standard series of specific, standardized allergens are applied to the skin and the response measured. The operative word here is "specific." Allergy tests measure the response of an individual's immune system to a specific allergen. Unfortunately, purified allergens have been prepared for only a very, very few mold species. Thus, a standard allergy test may be worthless or, at best, of dubious value in determining whether an individual is allergic to mold. The allergy test may give a negative result, but that proves only that the individual was not allergic to the mold species tested. It does not rule out the possibility that the individual is not allergic to a closely related mold species to one tested or of any of the other thousands of mold species to which the individual might be exposed.

Thus, we are faced with a paradox. Experts believe it is certain that a relatively large number of individuals may be allergic to certain species of molds, but, at least to date, it has been difficult to prove the allergic link to molds. Until better and more specific mold-sensitivity tests are available, it will be difficult to isolate specific mold species as an isolated causative factor for allergic reactions for most individuals.

There are some mold species that are known to be the causative factor for pathogenic infection in humans. However, instances of infection are very rare, and have been seen only in

certain susceptible individuals, such as persons whose immune system is seriously compromised from disease or drug treatment. Aspergillosis is an infection caused by molds in the genus *Aspergillus*. The infection can affect the skin causing severe, itching rashes, and can affect the eyes, lungs or other internal organisms. Other mold-related infections such as histoplasmosis can occur when individuals are exposed to molds that are carried by certain animals, particularly birds or bats, or molds that develop and grow on the droppings of these animals.

Another rarely seen symptom of mold exposure is the mucus membrane irritation effects usually are associated with volatile compounds (VOCs) produced by the molds' metabolism and released into an indoor air environment as the mold consumes its food source. The symptoms are manifested by irritation of the mucus membranes of the eyes and respiratory system. These mold-metabolite effects are generally at a very low level and noticeable only in especially sensitive individuals. Some of these VOCs are produced continually as the fungus consumes its energy source. In other instances, semi-toxic or toxic gases can be released from the substrate on which the mold is growing.

Many of these mold metabolism-related volatile compounds may be familiar to us. These compounds create what we may describe as a pungent or unpleasant odor. A good example is the odors that we may encounter in a damp basement that we may describe as "moldy" or "musty." Another example is the odor associated with certain spoiled foods such as moldy bread. For the most part, these are not harmful, but in rare cases, if a mold species is growing on a source that contains certain chemicals, a toxic gas can be produced. On the other hand, there are other examples of mold metabolism-related volatile compounds that most people consider pleasant such as the odors from cheese.

Many species of mold are known to produce secondary chemicals called metabolites.

Some metabolites are beneficial to man. For example, the antibiotic penicillin is a chemical isolated and extracted from cultures of molds in the group that includes the common bread molds. Other species, however, produce secondary metabolites that are known to be harmful, even toxic. Toxic effects from molds are relatively rare, but one group of secondary metabolites called mycotoxins are known to cause illness, sometimes even severe illness, in susceptible individuals.

Mycotoxins are considered to be “secondary” metabolites because they are not considered essential to the mold cells ordinary existence, but instead believed to provide the mold cell protection from attack by other molds or bacteria which are vying for the same ecological niche. In humans and some animals, mycotoxins attack the cellular processes of the exposed individual and can, in some cases, cause serious toxic effects by disrupting the cellular processes in the gut, skin or lungs. Such cellular-level effects on the exposed person can be deleterious to the lungs and respiratory tract, and can increase the susceptibility of the exposed person to infectious disease and/or reduce his defenses to other contaminants. Although there have been some reports of death resulting from severe exposure to molds, most experts appear to assign little or no credibility to these reports, and mold-related illnesses generally are not considered to be life-threatening.

The harmful effects in humans from mold mycotoxins are considered rare and all reported cases have involved prolonged and significant exposure to specific mold species. Most credible records of mycotoxin-related effects have occurred in individuals who ingested significant quantities of mold-contaminated food such as moldy grains, but some inhalation cases have been reported for individuals exposed to environments with dried materials heavily contaminated by molds such as moldy hay. A few cases of severe skin reactions have been

related to handling of materials contaminated with significant colonies of some molds.

Mycotoxins vary in specificity and potency depending on the environmental conditions in which the mold exists and the substrate on which the mold is growing. It is thought that when conditions conducive to mold growth occur, several different mold species that produce mycotoxins may occur together and the mycotoxin mixture can produce health effects that may be more problematic than mycotoxins from any single mold.

The more common symptoms caused by mycotoxins include diarrhea, vomiting, respiratory distress, headache, rashes, and photosensitivity. In rare cases, the effects can be more serious with manifestation of tremors, in-coordination, mental depression, and urinary tract problems.

#### **D. Importance of Conducting Mold Investigations and Due Diligence Issues**

When mold is suspected of causing a health effect, an appropriate investigation may be warranted. To begin, the affected person should be examined by a knowledgeable physician who specializes in the fields of internal medicine, occupational medicine and/or toxicology and who has some understanding of building-related illnesses, molds, and other causative agents. The doctor may have to perform tests and laboratory studies to determine whether the symptoms could be related to molds and to rule out other agents that can cause similar symptoms. If the doctor determines that molds are or may be implicated, an industrial hygienist or other qualified professional can inspect the building and conduct tests of air quality both inside and outside the building and also investigate the possible sources of mold contamination. The hygienist will look under and behind walls and/or carpeting where moisture conditions may be conducive to mold growth and development.

If molds are discovered, another expert may be needed to identify the species or types of molds present. It is well accepted that most molds cause no ill effects, while other species that may appear almost identical may cause harm. Thus, a critical issue to be determined is what species of mold is present. The task of identification of molds is relatively difficult, and finding an appropriate expert with the necessary training and experience may be difficult.

On a local level, there are private companies that offer mold audit and remediation services. Qualified individuals from these private companies or a professional industrial hygienist can probably identify the genus or general group to which a particular mold belongs. However, to obtain a more precise identification, to find out the exact species of mold you are dealing with, you may have to submit a sample of the mold to a mycologist, i.e., a specialist in fungus studies, at a university.

In a mold contamination scenario, some degree of remediation may be needed. In some instances, the situation may be remedied by simply correcting a water leak or by improving ventilation. In other instances, however, expert, professional remediation may be appropriate. These more serious situations may require removal of occupants and residents from the building while extensive renovation and repairs are made. In a very few instances, it may be necessary to destroy and remove some part or all of the building.

Some experts believe modern buildings are more mold-favorable than older buildings. The difference, according to these experts, is that modern buildings have less natural ventilation and almost total reliance on closed cooling and heating systems. Also, walls in older buildings were more likely to be covered with plaster, whereas walls in modern buildings are more likely to be covered with sheetrock or drywall with paper backing. The cellulose in paper is a favorite food source of molds, and when the moisture conditions are favorable, mold development on

these walls is encouraged. Others believe modern construction techniques are more susceptible to water intrusion. For example, the use of synthetic stucco exterior cladding systems, i.e., EIFS, is a commonly cited example of modern construction techniques that have been found to be very susceptible to water intrusion.

### **E. Medical Impact and Realities**

Most species of mold are harmless. Those relatively few species that are known to pose any threat to human health are generally considered to be those found in one of four genera or groups of species: *Penicillium*; *Aspergillus*; *Stachybotrys*; and *Cladosporium*.

*Penicillium*: Species of *Penicillium* are commonly found indoors, even in clean environments. Indeed, how many of us have never found a piece of moldy bread in our home? Species of this group of molds are commonly found in carpet, wallpaper and interior fiberglass insulation. Some species produce mycotoxins, both from the spores or the mycelium, i.e., the vegetative portion of the mold. Vitality of the spores or mycelium is not essential to toxicity, and a spore that is not viable can still be a source of toxin.

The mycotoxins from *Penicillium* molds have been linked to asthma conditions and, in cases of hypersensitive individuals and significant exposure, pulmonary complications may occur.

*Aspergillus*: Several species of mold in this group are known to produce mycotoxins that can cause illness. Among the most widely studied mycotoxins of any mold are the aflatoxins produced by two different species of this genus; *Aspergillus parasiticus* and *Aspergillus flavus*. These are among the most toxic substances known, and can cause acute toxicity to the heart, liver, kidneys and brain. Symptoms include fever, vomiting, and, in extreme cases, coma, convulsions, and even death. With chronic exposure, these mycotoxins are

known to be carcinogenic. Fortunately, these molds are not usually found associated with residential or office environments unless the environmental conditions are very conducive to mold development and growth.

The most common species of this genus found in “wet” buildings is *Aspergillus versicolor*.

This mold is commonly found on wallpaper, wooden floors, fiberboard and other building materials where moist conditions exist. This species does not produce the dangerous aflatoxins, but it does produce a less harmful toxin that can cause minor ill effects in sensitive persons exposed to significant contamination.

There has been some speculation that molds in this group are a causative factor for what is generally called Sick Building Syndrome (“SBS”). SBS was first employed in the 1970s, and describes a situation in which some or all of a population of building occupants can be temporarily affected and their symptoms are associated with their presence in that building. Typically, although not always, the structure is an office building. Generally, the spectrum of specific and non-specific complaints involved include eye, nose and throat irritation, a dry cough, dry or itchy skin, dizziness and nausea, difficulty in concentrating, and a general fatigue or malaise-type complaint. Another key factor that is commonly seen in sick building syndrome cases is the commonality of symptoms and the absence of symptoms when the building occupants are not in the building.

There has been a lot of speculation about the cause or causes of sick building syndrome. Factors alleged to be responsible for SBS include inadequate ventilation, chemical contaminants from indoor sources including chemicals associated with carpet, adhesives, upholstery, manufactured wood product, copy machines, pesticides, and cleaning agents, chemical

contaminants from outdoor sources such as motor vehicle exhausts, and/or biological contaminants such as bacteria and molds. Thus far, however, there is no credible evidence linking molds or mold contamination of any species to SBS, and the specific cause(s) of SBS remain unknown. Most often, the problems have been attributed to poor design, maintenance and/or operation of the building's ventilation system. Also, some believe that other contributing elements to sick building syndrome may be attributed to poor lighting and adverse ergonomic conditions, temperature extremes, noise and psychological stresses. It might be of interest to note that sick building syndrome is not the same thing as the notorious Legionnaires disease. Legionnaires disease is a pneumonia-like affect that primarily attacks exposed people over 50 years of age and especially individuals who have immuno-suppression issues, who smoke or use alcohol. The causative agent for Legionnaires disease is a bacterium called *Legionella pneumophila*, which is often found associated with cooling systems, humidifiers, misters, whirlpool baths and other moisture sources.

*Cladosporium*: There are more than 30 different species in this genus of molds. They are the most commonly encountered molds found in both indoor and outdoor air. Molds in this group are often associated with plants, wood products and leather goods. They are especially plentiful in buildings that have experienced water damage. These molds may vary in color from gray to black, but in general they will have a powdery appearance. They are generally considered to be very susceptible to dispersion in air.

The *Cladosporium* molds have been blamed as a common cause of respiratory problems, allergic reactions and other hypersensitivity conditions. While it is not clear that they are a direct cause of infection, some species have been found associated with infections of the skin, soft tissues and nails of humans. These molds also have been found to be one of the causes

of hypersensitivity pneumonitis. This condition has been identified with various groups of individuals exposed to indoor airborne antigens in both residential and office buildings and barns. In office buildings, the condition has been traced to air conditioning and humidification systems contaminated with bacteria and/or molds. The condition has been called humidifier fever. In the home, most cases have been in situations where pet birds are maintained. The condition is characterized by flu-like symptoms, including headache, chills, myalgia, fever, and fatigue. Usually, there are not any lung-related respiratory symptoms. Generally, once exposure is terminated, the symptoms disappear. Some have included these molds as a possible causative factor for Sick Building Syndrome. Again, however, there appears to be no evidence linking these molds to SBS.

*Stachybotrys*: This group includes one species, *Stachybotrys chartarum*, which has been the focal point of most of the popular press stories on the threat of mold contamination. This and related molds are generally referred to as “black mold” in recognition of the black color of the spores. In a moist environment, the black mold has a sticky appearance and consistency and is not easily aerosolized so that it disperses in the air. However, if the moisture source dries up, the mycelium can disintegrate into tiny fragments and along with the spores can be easily transported on air currents where they can be inhaled or deposited on materials that are ingested.

Black mold needs a very wet environment to thrive. Thus, if black mold is found in a building, it will usually be in a location where moisture has accumulated from roof or wall leaks, or chronically wet areas near a plumbing leak. It grows readily on wet hay or straw in barns or storage buildings, or on wall paper, sheet rock, ceiling tiles, carpet or cellulose-based insulation.

Almost all of the early stories and research of black mold was in Russia. In fact,

the first real indication that exposure to molds might be harmful was reported in Russia. In the earlier part of the 20<sup>th</sup> Century, Russia reported that thousands of horses died after eating hay contaminated with large quantities of black mold. Apparently, horses are especially susceptible to the mycotoxins of black mold. Later, in the 1930s' and 1940s' a number of reports of human illness in Russia were tracked to ingestion of moldy grain products. Other studies have shown that humans who frequently handle quantities of contaminated materials such as moldy hay, i.e., agricultural workers, have been found to be more likely to experience black mold symptoms than any other group.

The symptoms of black mold in humans runs the gamut from cough, rhinitis, general flu-like symptoms, headaches, burning sensations in the mouth and nasal passages or protected areas of heavy perspiration such as the armpits, fatigue, general malaise and, in some cases psychological depression and hair loss.

A study in Cleveland, Ohio in 1993 is generally credited with heightening concern and awareness of the possible link between mold contamination and illness. A physician in Cleveland published a report attributing 37 cases of serious respiratory illness in infants, with 12 deaths, to the black mold *Stachybotrys chartarum*. This report was followed by a large number of press reports across the country reporting similar affects. However, the Center for Disease Control and other studies questioned the validity of the Cleveland report and this “epidemic” has been largely discredited.

## **F. Importance of Proactive Detection and Management of Water Intrusion and Mold**

It is well established that mold growth and development is primarily limited by moisture. Thus, indoor colonies of mold are most often observed in bathrooms, basements, kitchens or

other areas where water intrusion has been allowed to occur. Although not generally visible, mold colonization also frequently occurs behind walls or external cladding systems such as synthetic stucco (EIFS)<sup>1</sup> **where water intrusion or other water problems are allowed to persist.**

### **1. Building Management /Operations and Due Diligence**

At the outset, everyone must recognize and accept the fact that molds and the other agents that can cause health effects in some situations are ubiquitous and that it is essentially impossible to ensure no exposure. However, mold growth in buildings can always be traced to unaddressed moisture problems. Thus, prevention and control of excessive mold growth and the exposure of people to those molds can be accomplished with attention.

If molds are your concern, the initial step should be to identify the potential sources of mold contamination in the indoor environment. Remember that the presence of mold or any other pollutant does not mean that you have a problem because molds are present in all buildings. However, identification of the molds present is a step in assessing the air quality in the home or building. Another step is to look at the activities and lifestyle of the occupants. For example, adequate ventilation is very important. Signs that ventilation is inadequate include moisture condensation on windows or walls, smelly or stuffy air and dirty central air cooling equipment. It is a fact that molds will not thrive except in moist conditions, and it is a fact that significant mold colonies are almost always limited to situations where excessive moisture occurs. Thus, elimination or control of water intrusion from outdoor sources is very important. Repair of water leaks is the first step. Prevention of water intrusion around doors and windows and repair of leaky pipes is a must.

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1 External/Internal Finishing System

EIFS has been the subject of numerous lawsuits in recent years. In some instances, improper installation of the EIFS allows water to intrude and soak the wood framing inside the EIFS cladding. Significant rotting of the wood structures of the building may occur. Because of the excessive moisture conditions and lack of ventilation, the conditions are ideal for mold growth and development. Thus, in some of these cases, very significant mold colonies have been found associated with the water soaked wood under the EIFS cladding.

Another common source of indoor mold contamination is carpeting over concrete floors, especially in basements. Moisture bleeds through the concrete floor and is trapped in the carpeting and/or the carpet pad. There is plenty of organic material in the carpeting and padding, including the detritus of humans and pets, and coupled with the favorable moisture conditions, mold growth and development is encouraged.

One approach to lowering the concentrations of these indoor air pollutants is to increase the amount of outdoor air coming into the building. In modern office buildings, this may be not be easily accomplished. In homes, however, the simple act of opening windows and doors or operating attic fans is helpful. Also, because moisture conditions in kitchens and bathrooms are particularly conducive to mold development, running vent and exhaust fans in those rooms will help remove contaminants directly from the room and also increase the outdoor air ventilation rate.

There are several types of air cleaners on the market. Some have been found to be effective in removing mold spores and other contaminants; others are less effective. Generally, the effectiveness of the air cleaner will be related to the quality of the filters in the system and the volume of air moving through the system. Of course, the strength of the mold contamination or other air pollutant source will be a factor in the effectiveness of the air cleaner.

Should you clean the ducts in the air cooling system? This is a common question and there is not a simple answer. EPA recommends that if no one in your household suffers from allergies or unexplained symptoms or illnesses and if, upon a visual inspection of the inside of the ducts, you see no indication of large deposits of dust or mold and you do not detect the musty odor often associated with molds, it is probably unnecessary to clean the air ducts. Here, you should understand that it is not uncommon for the return register ducts to get dusty as dust-laden dust from the rooms is pulled through the grate and filter. This does not mean that your air ducts are contaminated with mold or dust.

On the other hand, if residents are experiencing unusual or unexplained symptoms of an illness that you think might be related to the indoor environment, you should discuss the situation with your doctor.

EPA reports that duct cleaning has never been shown to actually prevent health problems. EPA also reports that studies do not demonstrate that dust or mold levels in homes increase because of dirty air ducts or that the dust or mold levels decrease after the air ducts are cleaned. Apparently, that is because much of the mold or dirt that may accumulate inside the ducts does not necessarily enter the living space. Finally, you have to keep in mind that dirty or moldy air ducts is only one of many possible sources of air pollution in the building. Thus, EPA does not recommend that air ducts be cleaned except on an as-needed basis. However, if one wishes to have the air ducts cleaned, service providers are generally available and can be found in the Yellow Pages.

Finally, with regard to air ducts, if mold contamination is your concern, it is probably much more important that you prevent or control moisture in the air ducts rather than dust. Controlling moisture is always the most effective way to prevent or minimize mold growth.

Moisture can enter the duct system through leaks or through condensation. Condensation occurs when a surface is lower than the dew point temperature of the surrounding air. Thus, it is common to have condensation on or near the cooling coils of the air conditioning unit. You should make sure the condensation collection pan drains properly. Also all ducts should be properly sealed and insulated in all non-air conditioned spaces such as attics and crawl spaces. That will help prevent moisture due to condensation from entering the ducts.

### **G. How to Investigate and Test for Mold**

Inasmuch as molds must have a favorable moist environment for survival, the most likely site for mold development will be areas of a building where moisture is greatest. In homes, that will include bathrooms and kitchens. However, there are other areas that may provide high relative humidity and moisture conditions that must be inspected. For example, concrete basement floors covered with carpet are often found to be a wonderful environment for molds. Moisture bleeds through the concrete and is trapped in carpet that contains all sorts of animal and human detritus that creates an almost perfect environment for mold development. Other sites that should be investigated include areas where plumbing leaks are present or where there is excessive humidity or condensation.

### **H. How to Conduct and Handle Remediation/Abatement**

For remediation of larger buildings such as office buildings, professional remediation may be needed. There is very little consensus regarding the proper methods of remediating a mold contaminated structure. The Independent Insurance Agents of America estimate the average cost of remediating a commercial building is \$300,000, and the average remediation cost

for a professional remediation of a residence is \$50,000. There are no universally accepted scientific standards for mold remediation. However, a few agencies including the United States EPA have published guidelines. These guidelines do not support the widespread removal of building materials just because mold is present. In fact, they confirm that most non-porous building materials such as lumber, can easily be disinfected and the wood infrastructure should not be removed unless the mold has impaired its structural integrity through direct action such as dry rot.

The general consensus regarding remediation boils down to an understanding that remediation should be viewed from the same perspective as that of the EPA which states that “there is no practical way to eliminate all molds and mold spores in the indoor environment.”<sup>2</sup>

**All experts recognize that a mold-free environment is simply not achievable, regardless of the intensity of the remediation protocol implemented. Indeed, any new construction material will often reintroduce mold to the premises because mold is very frequently found on drywall, lumber, and other construction products and the growth of that mold will be triggered by any event that introduces moisture.**

**Regardless of whether the building is a single family residence or an office building, the focus is the same, to eliminate or control water intrusion and improve ventilation. In an ordinary residential environment, most remediation and abatement of mold contamination can be accomplished by the residents. This will include:**

**a. Repair of any water leaks around windows, doors and the roof.**

**b. If the home is built with a crawl space, a plastic moisture barrier must be installed over the dirt.**

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2 “Mold Resources--10 Things You Should Know About Mold.” US EPA.  
(<http://www.epa.gov/iaq/molds/moldresources.htm>) April 2003.

**c. Intrusion of water and presence of standing water under the house must be prevented.**

**d. Use exhaust fans in bathrooms and kitchens to remove moisture to the outside and to improve air flow and ventilation.**

**e. If you notice moisture on interior surfaces of windows or walls, eliminate or minimize the use of humidifiers or heaters that create moisture.**

**f. Use dehumidifiers and/or air conditioners.**

**g. Ensure that all air conditioning ducts are properly sealed and insulated to prevent condensation from occurring inside the ducts.**

**h. Ensure that the condensation drip pans of the air conditioning system are properly drained to the outside.**

**i. Raise the temperature of walls and cold surfaces where moisture condenses. This may include the use of storm windows and increased insulation.**

**j. Keep interior doors open to encourage circulation of air.**

**k. If you have a basement with concrete floor, install a plastic moisture barrier over the floor and cover that with sub flooring or padding and carpet.**

**l. Ensure adequate ventilation from outside air.**

**m. If medical conditions that are unexplained have occurred, and if a doctor has suggested mold exposure may be involved, and if an inspection of air cooling ducts indicates the presence of mold, it may be prudent to consider cleaning the ducts. In most instances, that will require professional assistance.**

**Ultimately, the key factors for control or minimization of mold problems and the repair or remediation of an existing mold problem go back to water. No matter how**

thoroughly you clean a surface, it is essentially impossible to eliminate mold spores from the air so the chances of mold development are always good if moisture is favorable. Fresh air circulation is helpful in preventing a heavy buildup of the spore concentration in the air space, but to minimize and control mold you must control moisture.

There are those who have predicted that mold litigation will be of the same magnitude as asbestos litigation. Whether that turns out to be true or not, it is certain that the science of molds offers something to everyone. Whether you are considering mold litigation from the perspective of the plaintiff's bar or the defense bar, there is enough here to make you smile.

Issues that may appeal to a plaintiff's lawyer is the fact that there seems to be wide agreement among knowledgeable scientists and physicians that microscopic organisms with difficult to pronounce names can potentially cause serious injury, both direct and indirect, to humans, especially children, and that the presence of populations of these organisms in a building may be directly attributable to the design and quality of the construction of the building and/or the quality of maintenance operations. In addition, there are a number of examples where mold contamination could not be remediated and buildings, even relatively new and expensive buildings, had to be razed. In the hands of a skillful plaintiff's lawyer, evidence of such facts could be valuable.

On the other side, however, the defense lawyer also has a pretty good hand. Most knowledgeable scientists and physicians also agree that despite agreement that molds can cause illness, it is a fact that there is very little credible evidence that exposure to a mold-infestation has been found to be the causative factor. Mold exposure causes no measurable effect on most individuals and even in those rare individuals who may be affected, the

**symptoms of mold exposure are essentially indistinct from the symptoms of exposure to a large number of other extremely common man-made and natural contaminants. Thus, in almost all scenarios, the lack of causation card in the hands of a skillful defense lawyer will be hard to overcome.**

NOTE: This document is not intended to be legal advice. It does not identify all the issues surrounding the particular topic. Public agencies are encouraged to review their procedures with an expert or an attorney who is knowledgeable about the topic. Reliance on this information is at the sole risk of the user.<sup>1</sup>

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