



Mold in the Workplace

An Online Continuing Education Course for Engineers

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Credit: 1 Hour / 1 PDH / 1 CPD

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Introduction

Concern about indoor exposure to mold has increased along with public awareness that exposure to mold can cause a variety of health effects and symptoms, including allergic reactions. This course provides recommendations for the prevention of mold growth and describes measures designed to protect the health of building occupants and workers involved in mold cleanup and prevention.

After completing this course, individuals with little or no experience with mold remediation may be able to reasonably judge whether mold contamination can be managed in-house or whether outside assistance is required. The advice of a medical professional should always be sought if there are any emerging health issues.

The information in this course is intended only as a summary of basic procedures and is not intended, nor should it be used, as a detailed guide to mold remediation



Mold Basics

Molds are part of the natural environment. Molds are fungi that can be found anywhere - inside or outside - throughout the year. About 1,000 species of mold can be found in the United States, with more than 100,000 known species worldwide.

Outdoors, molds play an important role in nature by breaking down organic matter such as toppled trees, fallen leaves, and dead animals. We would not have food and medicines, like cheese and penicillin, without mold.

Indoors, mold growth should be avoided. Problems may arise when mold starts eating away at materials, affecting the look, smell, and possibly, with the respect to wood-framed buildings, affecting the structural integrity of the buildings.

Molds can grow on virtually any substance, as long as moisture or water, oxygen, and an organic source are present. Molds reproduce by creating tiny spores (viable seeds) that usually cannot be seen without magnification. Mold spores continually float through the indoor and outdoor air.

Molds are usually not a problem unless mold spores land on a damp spot and begin growing. They digest whatever they land on in order to survive. There are

molds that grow on wood, paper, carpet, foods and insulation, while other molds feast on the everyday dust and dirt that gather in the moist regions of a building.

When excessive moisture or water accumulates indoors, mold growth often will occur, particularly if the moisture problem remains uncorrected. While it is impossible to eliminate all molds and mold spores, controlling moisture can control indoor mold growth.

All molds share the characteristic of being able to grow without sunlight; mold needs only a viable seed (spore), a nutrient source, moisture, and the right temperature to proliferate. This explains why mold infestation is often found in damp, dark, hidden spaces; light and air circulation dry areas out, making them less hospitable for mold.

Molds gradually damage building materials and furnishings. If left unchecked, mold can eventually cause structural damage to a wood- framed building, weakening floors and walls as it feeds on moist wooden structural members. If you suspect that mold has damaged building integrity, consult a structural engineer or other professional with the appropriate expertise.

Since mold requires water to grow, it is important to prevent excessive moisture in buildings. Some moisture problems in buildings have been linked to changes in building construction practices since the 1970s, which resulted in tightly sealed buildings with diminished

ventilation, contributing to moisture vapor buildup. Other moisture problems may result from roof leaks, landscaping or gutters that direct water into or under a building, or unvented combustion appliance. Delayed or insufficient maintenance may contribute to moisture problems in buildings. Improper maintenance and design of building heating/ventilating/air-conditioning (HVAC) systems, such as insufficient cooling capacity for an air conditioning system, can result in elevated humidity levels in a building.

Health Effects

Currently, there are no federal standards or recommendations, (e.g., OSHA, NIOSH, EPA) for airborne concentrations of mold or mold spores. Scientific research on the relationship between mold exposures and health effects is ongoing. This section provides a brief overview, but does not describe all potential health effects related to mold exposure. For more detailed information, consult a health professional or your state or local health department.

There are many types of mold. Most typical indoor air exposures to mold do not present a risk of adverse health effects. Molds can cause adverse effects by producing allergens (substances that can cause allergic reactions). Potential health concerns are important reasons to prevent mold growth and to remediate existing problem areas.

The onset of allergic reactions to mold can be either immediate or delayed. Allergic responses include hay fever-type symptoms such as runny nose and red eyes.

Molds may cause localized skin or mucosal infections but, in general, do not cause systemic infections in humans, except for persons with impaired immunity, AIDS, uncontrolled diabetes, or those taking immune suppressive drugs. An important reference with guidelines for immunocompromised individuals can be found at the Centers for Disease Control and Prevention (CDC) website (www.cdc.gov).

Molds can also cause asthma attacks in some individuals who are allergic to mold. In addition, exposure to mold can irritate the eyes, skin, nose and throat in certain individuals. Symptoms other than allergic and irritant types are not commonly reported as a result of inhaling mold in the indoor environment.

Some specific species of mold produce mycotoxins under certain environmental conditions. Potential health effects from mycotoxins are the subject of ongoing scientific research and are beyond the scope of this document.

Eating, drinking, and using tobacco products and cosmetics where mold remediation is taking place should be avoided. This will prevent unnecessary contamination of food, beverage, cosmetics, and tobacco products by mold and other harmful substances within the work area.

Prevention

Moisture control is the key to mold control. When water leaks or spills occur indoors - act promptly. Any initial water infiltration should be stopped and cleaned promptly. A prompt response (within 24-48 hours) and thorough clean-up, drying, and/or removal of water-damaged materials will prevent or limit mold growth.

Mold prevention tips include:

- Repairing plumbing leaks and leaks in the building structure as soon as possible.
- Looking for condensation and wet spots. Fix source(s) of moisture incursion problem(s) as soon as possible.
- Preventing moisture from condensing by increasing surface temperature or reducing the moisture level in the air (humidity). To increase surface temperature, insulate or increase air circulation. To reduce the moisture level in the air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
- Keeping HVAC drip pans clean, flowing properly, and unobstructed.
- Performing regularly scheduled building/ HVAC inspections and maintenance, including filter changes.
- Maintaining indoor relative humidity below 70% (25 - 60%, if possible).

- Venting moisture generating appliances, such as dryers, to the outside where possible.
- Venting kitchens (cooking areas) and bathrooms according to local code requirements.
- Cleaning and drying wet or damp spots as soon as possible, but no more than 48 hours after discovery.
- Providing adequate drainage around buildings and sloping the ground away from building foundations. Follow all local building codes.
- Pinpointing areas where leaks have occurred, identifying the causes, and taking preventive action to ensure that they do not reoccur.

Questions That May Assist in Determining Whether a Mold Problem Currently Exists

- Are building materials or furnishings visibly moisture damaged?
- Have building materials been wet more than 48 hours?
- Are there existing moisture problems in the building?
- Are building occupants reporting musty or moldy odors?
- Are building occupants reporting health problems that they think are related to mold in the indoor environment?
- Has the building been recently remodeled or has the building use changed?

- Has routine maintenance been delayed or the maintenance plan been altered?

Always consider consulting a health professional to address any employee health concerns.

Remediation Plan

Remediation includes both the identification and correction of the conditions that permit mold growth, as well as the steps to safely and effectively remove mold damaged materials.

Before planning the remediation assess the extent of the mold or moisture problem and the type of damaged materials. If you choose to hire outside assistance to do the cleanup, make sure the contractor has experience with mold remediation. Check references and ask the contractor to follow the recommendations in EPA’s publication, “Mold Remediation in Schools and Commercial Buildings,” or other guidelines developed by professional or governmental organizations.

The remediation plan should include steps to permanently correct the water or moisture problem. The plan should cover the use of appropriate personal protective equipment (PPE). It also should include steps to carefully contain and remove moldy building materials in a manner that will prevent further contamination. Remediation plans may vary greatly depending on the size and complexity of the job, and may require

revision if circumstances change or new facts are discovered.

If you suspect that the HVAC system is contaminated with mold, or if mold is present near the intake to the system, contact the National Air Duct Cleaners Association (NADCA), or consult EPA's guide, "Should You Have the Air Ducts in Your Home Cleaned?" before taking further action. Do not run the HVAC system if you know or suspect the system is contaminated with mold. If mold contamination has occurred in the water or mold in the sewage or other cooling systems, consult a professional for cleaning and repair. Do not enter a building by contaminated with mold.

The remediation priority must be to protect the safety of the building occupants and the remediators. Remediation workers should not expose themselves to mold spores and dusts as they conduct remediation. Caution should be used to prevent mold spores from being released into the air where they can be inhaled by occupants. In some cases, especially those involving large areas of contamination, the remediation plan may include temporary relocation of some or all of the building occupants.

When deciding if relocating occupants is necessary, consideration should be given to the size and type of mold growth, the type and extent of health effects reported by the occupants, the potential health risks that could be associated with the remediation activity, and the amount of disruption this activity is

likely to cause. In addition, before deciding to relocate occupants, one should also evaluate the remediator's ability to contain/minimize possible aerosolization of mold spores given their expertise and the physical parameters of the workspace. When possible, remediation activities should be scheduled during off hours when building occupants are less likely to be present.

Remediators, particularly those with health concerns, may wish to check with their physicians or other health-care providers before working on mold remediation. If any individual has health concerns, or questions before starting a remediation/cleanup project, he or she should consult a health professional.

Remediation/Cleanup Methods

The first step in the remediation process of mold remediation is to identify the mold problem and to contain the mold-contaminated materials to prevent exposure and further spread of mold to building materials and furnishings. Porous materials that are wet and have mold growing on them may have to be discarded because molds can infiltrate porous substances and grow on or fill in empty spaces or crevices. This mold can be difficult or impossible to remove completely.

As a general rule, simply killing the mold, for example, with biocide is not enough. The mold must be removed, since the chemicals and proteins, which can cause a reaction in humans, are present even in dead mold.

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