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OSHA: A Brief Guide to Mold in the Workplace

http://www.osha.gov/dts/shib/shib101003.html (excerpts)

OSHA

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.

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.

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.

Since mold requires water to grow, it is important to prevent excessive moisture in buildings. Some moisture problems in buildings have been linked 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 appliances. 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.

There are no federal standards or recommendations for airborne concentrations of mold or mold spores.

HEALTH EFFECTS

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.

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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.

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.

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:

- Repair plumbing leaks and leaks in the building structure.
- Prevent condensation 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).
- Keep HVAC drip pans clean, flowing properly, and unobstructed.
- Perform regularly scheduled building/HVAC inspections and maintenance, including filter changes.
- Maintain indoor relative humidity below 70% (25 - 60%, if possible).
- Clean and dry wet or damp spots as soon as possible (within 48 hours).

QUESTIONS TO HELP DETERMINE WHETHER THERE IS A MOLD PROBLEM

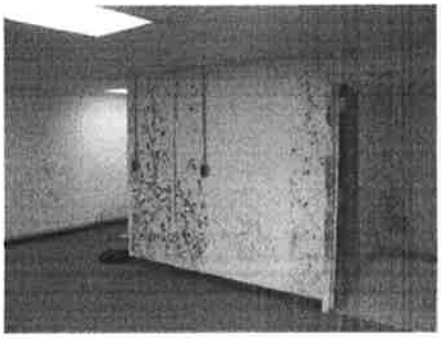
- Are building materials or furnishings moisture-damaged?
- Have building materials been wet more than 48 hours?
- Are there existing moisture problems in the building?
- Are building occupants reporting musty or moldy odors?
- Are building occupants reporting health problems that they think are related 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?

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.

Assess the extent of the mold or moisture problem and the type of damaged materials. If you 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 professional or governmental guidelines.



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.

The remediation manager's highest priority must be to protect the health and safety of the building occupants and remediators. Prevent mold and mold spores from being dispersed throughout the air where they can be inhaled by building occupants. When possible, remediation activities should be scheduled during off hours when building occupants are less likely to be affected.

MOLD REMEDIATION/CLEANUP METHODS

The purpose of mold remediation is to correct the moisture problem and to remove moldy and contaminated materials to prevent human exposure and further damage 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.

A variety of cleanup methods are available for remediating damage to building materials and furnishings caused by moisture control problems and mold growth, including:

Wet Vacuum

Wet vacuums are vacuum cleaners designed to collect water. They can be used to remove water from floors, carpets, and hard surfaces where water has accumulated. They should not be used to vacuum porous materials, such as gypsum board. Wet vacuums should be used only on wet materials, as spores may be exhausted into the indoor environment if insufficient liquid is present. The tanks, hoses, and attachments of these vacuums should be thoroughly cleaned and dried after use since mold and mold spores may adhere to equipment surfaces.

Damp Wipe

Mold can generally be removed from nonporous surfaces by wiping or scrubbing with water and detergent. It is important to dry these surfaces quickly and thoroughly to discourage further mold growth.

HEPA Vacuum

HEPA (High-Efficiency Particulate Air) vacuums are recommended for final cleanup after materials have been thoroughly dried and contaminated materials removed. HEPA vacuums also are recommended for cleanup of dust that may have settled on surfaces outside the remediation area. When changing the vacuum filter, workers should wear respirators, appropriate personal protective clothing, gloves, and eye protection to prevent exposure to any captured mold and other contaminants.

Disposal of Damaged Materials

Building materials and furnishings contaminated with mold growth that are not recoverable should be placed in sealed impermeable bags or closed containers while in the remediation area. These materials can usually be discarded as ordinary construction waste. Large items with heavy mold growth should be covered with polyethylene sheeting and sealed with duct tape before being removed from the remediation area. Some jobs may require the use of dust-tight chutes to move large quantities of debris to a dumpster strategically placed outside a window in the remediation area.

Use of Biocides

The use of a biocide, such as chlorine bleach, is not recommended as a routine practice during mold remediation, although there may be instances where professional judgment may indicate its use (for example, when immuno-compromised individuals are present). Biocides are toxic to animals and humans, as well as to mold. If you use disinfectants or biocides, ventilate the area, using outside air if possible, and exhaust the air to the outdoors.

MOLD REMEDIATION GUIDELINES

The level of personal protection suggested in these guidelines is based on the total surface area contaminated and the potential for remediator or occupant exposure. However, the remediation manager should rely on professional judgment and experience to adapt the guidelines to particular situations.

Level I: Small Isolated Areas (10 sq. ft or less) - e.g., ceiling tiles, small areas on walls.

Remediation can be conducted by the regular building maintenance staff as long as they are trained on proper clean-up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Respiratory protection (e.g., N-95 disposable respirator) is recommended. Respirators must be used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134). Gloves and eye protection should be worn.

The work area should be unoccupied. Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended. Contaminated materials that cannot be cleaned should be removed from the building in a sealed impermeable plastic bag. These materials may be disposed of as ordinary waste. The work area and areas used by remediation workers for egress should be cleaned with a damp cloth or mop and a detergent solution. All areas should be left dry and visibly free from contamination and debris.

Level II: Mid-Sized Isolated Areas (10-30 sq. ft.) – e.g., individual wallboard panels.

Remediation can be conducted by the regular building maintenance staff. Such persons should receive training on proper clean-up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Respiratory protection (e.g., N-95 disposable respirator) is recommended. Respirators must be used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134). Gloves and eye protection

should be worn.

The work area should be unoccupied. Surfaces in the work area that could become contaminated should be covered with a secured plastic sheet(s) before remediation to contain dust/debris and prevent further contamination. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended. Contaminated materials that cannot be cleaned should be removed from the building in sealed impermeable plastic bags. These materials may be disposed of as ordinary waste. The work area and areas used by remediation workers for egress should be HEPA vacuumed and cleaned with a damp cloth or mop and a detergent solution. All areas should be left dry and visibly free from contamination and debris.

Level III: Large Isolated Areas (30 –100 square feet) – e.g., several wallboard panels.

Industrial hygienists or other environmental health and safety professionals with experience performing microbial investigations and/or mold remediation should be consulted.

The following procedures may be implemented depending upon the severity of the contamination:

Personnel should be trained in the handling of hazardous materials and equipped with respiratory protection (e.g., N-95 disposable respirator). Respirators must be used in accordance with the OSHA respiratory protection standard (29 CFR 1910.134). Gloves and eye protection should be worn.

Surfaces in the work area and areas directly adjacent that could become contaminated should be covered with secured plastic sheets before remediation to contain dust/ debris and prevent further contamination. Seal ventilation ducts/grills in the work area and areas directly adjacent with plastic sheeting.

The work area and areas directly adjacent should be unoccupied. Dust suppression methods, such as misting (not soaking) surfaces prior to mediation, are recommended. Contaminated materials that cannot be cleaned should be removed from the building in sealed impermeable plastic bags. These materials may be disposed of as ordinary waste. The work area and surrounding areas should be HEPA vacuumed and cleaned with a damp cloth or mop and a detergent solution. All areas should be left dry and visibly free from contamination and debris.

If abatement procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of the mold is heavy (blanket coverage as opposed to patchy), the remediation procedures for Level IV, below, should be followed.

Level IV: Extensive Contamination (greater than 100 contiguous square feet in an area).

Industrial hygienists or other environmental health and safety professionals with experience performing microbial investigations and/or mold remediation should be consulted.

The following procedures may be implemented depending upon the severity of the contamination:

Personnel should be trained in the handling of hazardous materials and equipped with:
•Full face piece respirators with HEPA cartridges;
•Disposable protective clothing covering the entire body including gloves and head and shoe covers.

Containment of the affected area:
•Complete isolation of work area from occupied spaces using plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and other openings);
•Use of an exhaust fan with a HEPA filter to generate negative pressure;
•Airlocks and decontamination room.

If containment prevents mold from migrating from affected areas, it may not be necessary to remove people from surrounding work areas. However, removal is still recommended for infants, persons having undergone recent surgery, immune- suppressed people, or people with chronic inflammatory lung diseases. (e.g., asthma, hypersensitivity pneumonitis, and severe allergies).

Contaminated materials that cannot be cleaned should be removed from the building in sealed impermeable plastic bags. The outside of the bags should be cleaned with a damp cloth and a detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to uncontaminated areas of the building. These materials may be disposed of as ordinary waste. The contained area and decontamination room should be HEPA vacuumed and cleaned with a damp cloth or mopped with a detergent solution and be visibly clean prior to the removal of isolation barriers.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Any work that disturbs mold and causes mold spores to become airborne increases the degree of respiratory exposure. Actions that tend to disperse mold include: breaking apart moldy porous materials such as wallboard; destructive invasive procedures to examine or remediate mold growth in a wall cavity; removal of contaminated wallpaper by stripping or peeling; using fans to dry items or ventilate areas. The primary function of personal protective equipment is to prevent the inhalation and ingestion of mold and mold spores and to avoid mold contact with the skin or eyes.

Skin and Eye Protection

Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of substance/ chemical being handled. If you are using a biocide such as chlorine bleach, or a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or PVC. If you are using a mild detergent or plain water, ordinary household rubber gloves may be used.

Use properly fitted goggles or a full face piece respirator. Goggles must be designed to prevent the entry of dust and small particles. Safety glasses or goggles with open vent holes are not appropriate in mold remediation.

Respiratory Protection

Either a half mask or full face piece air-purifying respirator can be used. A full face piece respirator provides both respiratory and eye protection. Refer to the discussion of the different levels of remediation (above) to ascertain the type of respiratory protection recommended. Respirators used to provide protection from mold and mold spores must be certified by the National Institute for Occupational Safety and Health (NIOSH). *More protective respirators may have to be selected and used if toxic contaminants such as asbestos or lead are encountered during remediation.*

As specified by OSHA in 29 CFR 1910.134 individuals who use respirators must be properly trained, have

medical clearance, and be properly fit tested before they begin using a respirator. In addition, use of respirators requires the employer to develop and implement a written respiratory protection program, with worksite-specific procedures and elements.

Protective Clothing

While conducting building inspections and remediation work, individuals may encounter hazardous biological agents as well as chemical and physical hazards. Consequently, appropriate personal protective clothing (i.e., reusable or disposable) is recommended to minimize cross-contamination between work areas and clean areas, to prevent the transfer and spread of mold and other contaminants to street clothing, and to eliminate skin contact with mold and potential chemical exposures.

Sampling for Mold

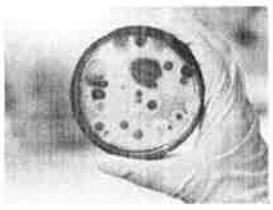
Is it necessary to sample for mold? *In most cases, if visible mold growth is present, sampling is unnecessary.* Decisions about appropriate remediation strategies often can be made on the basis of a visual inspection.

The first step should be to inspect for any evidence of water damage and visible mold growth. Testing for mold is expensive, and there should be a clear reason for doing so. There are no standards for "acceptable" levels of mold in buildings, and the lack of a definitive correlation between exposure levels and health effects makes interpreting the data difficult, if not impossible.

Testing is usually done to compare the levels and types of mold spores found inside the building with those found outside of the building or for comparison with another location in the building. If you know you have a mold problem, it is more important to spend time and resources removing the mold and solving the moisture problem that causes the moldy conditions than to undertake extensive testing for the type and quantity of mold.

Sampling for mold should be conducted by professionals with specific experience in designing mold-sampling protocols, sampling methods for microbial contaminants, and interpretation of results. Types of samples can include: air samples, surface samples, bulk samples, and water samples from condensate drain pans or cooling towers.

Microscopic identification of the spores/ colonies requires considerable expertise. These services are not routinely available from commercial laboratories. Documented quality control in the laboratories used for analysis of the bulk, surface, and other air samples is necessary. The American Industrial Hygiene Association offers accreditation to microbial laboratories (Environmental Microbiology Laboratory Accreditation Program - EMLAP).



WHEN IS REMEDIATION/CLEANUP COMPLETE?

✔You have identified and corrected the source of the water or moisture problem.
✔Visible mold, mold-damaged materials, and moldy odors are no longer present.
✔Sampling, if conducted, shows that the level and types of mold and mold spores inside the building are similar to those found outside.