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Physical Plant Procedure Letter

MOLD PREVENTION AND CLEANING

Table of Contents

1. Preventing Mold Problems.....	4
a. Controlling Humidity Level (Relative Humidity)	
b. Monitoring Relative Humidity	
c. Dehumidification.....	5
d. Preventing Water Leaks / Water Intrusion.....	6
i. Leaking Pipes	
ii. Foundation	
iii. Roof	
iv. Windows.....	7
v. Walls	
vi. Gutters	
e. Basements / Crawl Spaces	
f. Ductwork / HVAC System.....	8
i. Sanitize Cooling Coils	
ii. Drain Pan	
iii. Filters	
iv. Insulation	
g. New Construction.....	9
h. Ventilation	
i. Venting Combustion Appliances	
j. Shower Curtains	
k. Air Purification	
2. Signs of a Mold Problem.....	10
a. High Humidity	
b. Water / Pipe Leaks	
c. Flooding	
d. Mildewy / Musty Odors	
e. Increased Allergy / Respiratory Symptoms	
f. Signs of Toxic Poisoning	
g. Leaky Roof.....	11
h. Use of Humidifiers without Relative Humidity Control	
i. Damp Basements of Crawl Spaces	
j. Condensation or Rusting	
k. Plants	
l. Discoloration of Walls (Water Stains)	
m. Cracked, Peeling Paint	
n. Blocked Gutters	
o. Warped Wood	
p. Black Growth in Bathroom Tiles.....	12
q. Loosening of Drywall Tape	
r. Visible Biological / Mold Growth	
s. Clothes Dryers / Other Appliances Not Vented Outdoors	
t. Poor Ventilation	
u. Presence of Wet Materials Indoors	
v. Mold Test	

3. How to Clean Up a Mold Problem.....	13
a. Resolve Moisture Problem	
b. Minimize Dust and Seal Off Area (Negative Pressure)	
i. Containment	
ii. Minimizing Dust	
c. Cleaning the Mold.....	14
d. Remove the Mold	
e. Verifying the Mold Clean-Up Job was Successful	
4. Protecting Your Health During Mold Clean-Up	
a. Respirator.....	15
b. Clothing	
c. Evacuate	
d. Work in Short Intervals	
e. Moldy Materials	
f. Seal Off Area	
g. Containment	
h. Air Out / Dry	
i. Air Purification	
5. Review of Mold Disinfectants	
6. Cleaning Mold in the HVAC System.....	16
7. Common Species of Mold	
a. Aspergillus.....	17
b. Stachybotrys	
c. Cladosporium	
d. Fusarium	
e. Penicillium	
f. Mycotoxins	
8. Mold Test Kit Review.....	18
9. Health Risks.....	20
a. Allergy	
b. Irritation	
c. Invasive Disease	

Ways to Prevent Mold Problems

To monitor the relative humidity level throughout the building, you will need **relative humidity sensors**, also known as **hygrometers** or **moisture mete**

Preventing Water Leaks / Water Intrusion

Other than just having a high humidity level in the building (due to humid climate), water leaks and other forms of water intrusion into the home or building is the most common reason a toxic black mold problem originates.

Below are types of water leaks and places where unwanted water can enter the building, and ways to avoid these types of water intrusion problems.

Leaking Pipes:

Condensation or **rusting** on or around a pipe is a sign of a leak. Covering cold surfaces, such as cold water drainpipes, with insulation helps to prevent condensation.

The most difficult part of preventing leaking pipes is determining whether or not they are leaking in the first place, since they are normally concealed from view.

Here are some signs to look for:

1. You can hear running water sounds when nothing is turned on.
2. Musty odors that seem to originate from walls or floors.
3. Running toilets and dripping faucets.
4. Abnormally high water bills.
5. A water meter reading that changes when you aren't using any water for an hour.
6. Discolored or damaged walls.
7. A cracked or damp foundation or slab.
8. Warm spots on concrete slab floors, mildew, or excess moisture under carpets.
9. Regular sewer backups.
10. Areas in the yard that are too wet and with unusual plant or grass growth.

Foundation:

To prevent water from collecting around the foundation, and seeping up through the walls, mab3p/EMC /P MCID 15 BDC s(b3p/11 nr(b3a

Insulation

If you have **insulation lining the interior** of the ductwork, then it should be **removed**, so you are left with bare sheet metal. The fiberglass insulation collects a lot of dirt and dust, which provides a good habitat for mold colonies. Once the mold begins to grow inside the ductwork, the mold spores will be spread throughout the house when the HVAC system is running.

New Construction

In many cases, mold problems can be avoided or caused during the construction of a building. In which case, you can take precautions during this phase to save yourself mold headaches down the road.

First, **review many of the tips on this page** to make sure that the building is constructed in such a way that as many of these as possible can be put into place.

In addition, **avoid using moldy materials**, ensure that any fake stucco that is used is installed 100% properly, since this is a common cause for mold growth in exterior wall cavities. If you are really adamant about preventing potential mold problems, then you may want to avoid using fake stucco altogether.

Dirt / Dust Removal

An environment that is "dirty" or "dusty" is far more conducive to mold problems than a clean environment. Dirt, dust, and grime are often composed of **organic material**, which is a staple of the **toxic "black" mold diet**.

Dust also serves as a **means for locomotion** for mold spores, enabling them to spread throughout the home more effectively.

Ventilation

7. Leaky Roof

Like other types of water leaks, water intrusion through the roof is difficult to find until it is too late. If you suspect a leaky roof, **check in the attic** for signs of water damage or mold growth. Also be on the lookout for signs of water damage or mold growth in **ceilings** on the **uppermost floor** of the building.

8. Use of Humidifiers without Relative Humidity Control

Using humidifiers can easily **raise the moisture level** in the air to the point where **mold is able to grow** at a rapid rate. When using a humidifier, the key is to regulate the relative humidity level, to ensure it **stays within 55-60% RH**.

This can be accomplished with a relative humidity sensor. However, if you are using a humidifier, it is best to have one that can be **programmed to automatically shut off when relative humidity reaches 60%**.

9. Damp Basements or Crawl Spaces

Basements and crawl spaces tend to receive **less ventilation** (especially crawl spaces), while also seeing **cooler temperatures**. With all things being equal, cooler temperatures will lead to a **higher relative humidity** percentage, since cooler air is able to hold less water before **condensation** occurs. Of course condensation means moisture.

In addition to all of this, basements and crawl spaces are more likely to be **neglected** than if like other parts of the house.

16. Black Growth in Bathroom Tiles

Bathrooms are a favorite breeding ground of mold. The **increased moisture**

What's Next

If the signs point to a mold problem, then the next step is to find the mold growth, so it can be cleaned and removed.

You should also start employing methods to prevent further mold growth (prevent it as much as humanly possible anyway).

How to Clean Up a Mold Problem

Steps to Mold Clean-Up

1. Resolve Moisture Problem

Most importantly, the source of the water accumulation must be identified and fixed or fungal growth will continue to occur. If you have a high relative humidity in a room or area (55% or higher), then you should strongly consider a dehumidifier. To determine the relative humidity, you will need a relative humidity sensor, also known as a moisture meter or hygrometer.

If you experi

Ionizers are typically better than air filters, since they can remove smaller particles from the air, and do not rely on particulate passing through them in order to remove them from the air.

3. Cleaning the Mold

1. Wear Respirator

Wear a medium-efficiency or high-efficiency filter dust mask or respirator with HEPA filter to protect against the inhalation of mold spores. For the best protection, choose a respirator designed for particle removal such as the model **N95** or **TC-21C particle respirator**.

2. Clothing

Wear protective clothing that is **easily removed, cleaned**, and that **covers all areas of the body** to prevent against any dermal (skin) exposure. You may even want to choose a

3. Phenolics:

Bactericidal, Virucidal, Fungicidal. Use a diluted concentration of 0.4 to 0.5%.

Advantages - inexpensive, residual

Disadvantages - toxic, irritating, and corrosive

4. Iodophors:

Bactericidal, Virucidal, Fungicidal, Sporocidal and Tuberculocidal if c

Aspergillus spp

Aspergillus is the most common genus of fungi in our environment with more than 160 different species of mold. Sixteen of these species have been documented as causing human disease. Aspergillosis is now the **2nd most common fungal infection requiring hospitalization** in the United States .

Aspergillus fumigatus. The most encountered species causing infection. It is seen abundantly in decomposing organic material, such as self-heating compost piles, since it readily grows at temperatures up to 55 C. People who handle contaminated material often develop hypersensitivity to the spores of *Aspergillus* and may suffer severe allergic reactions upon exposure.

Aspergillus flavus. The 2nd most encountered fungi in cases of *Aspergillus* infection. It is also known to produce the mycotoxin aflatoxin, one of the most potent carcinogens known to man. In the 1960s, 100,000 turkey poults in Great Britain died from ingesting contaminated feed. Most countries have established levels for aflatoxin in food. However, the risks associated with airborne exposure are not adequately studied and no exposure standards exist.

Aspergillus niger. The 3rd most common *Aspergillus* fungi associated with disease and the most common of any *Aspergillus* species in nature due to it's ability to grow on a wide variety of substrates. This species may cause a "fungal ball", which is a condition where the fungus actively proliferates in the human lung, forming a ball. It does so without invading the lung tissue.

Stachybotrys chartarum (atra)

The genus *Penicillium* has several species. The most common ones include *Penicillium chrysogenum*, *Penicillium citrinum*, *Penicillium janthinellum*, *Penicillium marneffei*, and *Penicillium purpurogenum*.

This fungi has been isolated from patients with keratitis, ear infections, pneumonia, endocarditis, peritonitis, and urinary tract infections. *Penicillium* infections are most commonly exhibited in immunosuppressed individuals. For example, *P. marneffei* is a fungus abundant in Southeast Asia that typically infects patients with AIDS in this area. Infection with *P.marneffei* is acquired via inhalation and initially results in a pulmonary infection and then spreads to other areas of the body (lymphatic system, liver, spleen, and bones), and is often fatal. An indication of infection is the appearance of papules that resemble acne on the face, trunk, and extremities.

Penicillium spp. do have the ability to produce mycotoxins. The mycotoxin known as Ochratoxin A, which is nephrotoxic and carcinogenic, may be produced by *Penicillium verrucosum*. Verrucosidin is another mycotoxin produced by this fungus that exhibits neurotoxicity. Penicillic acid is another mycotoxin that is nephrotoxic (causes kidney and liver damage).

Mycotoxins

During the digestion

broken off into the growth solution vial. The vial and swabbed applicator sent to a lab for plate culturing and counting.

Pros: Inexpensive; non-destructive; rapid analysis for spore counts; results can be quantitative and cultured for speciation; sampling can be performed on irregular surfaces.

Cons: Results do not relate directly to airborne exposures; fungal structures may be damaged during collection causing identification of the mold to be less accurate; spores may germinate before lab analysis; may miss presence of organisms in porous materials; and sample collection does not work well on dry surfaces.

The ProLab Mold Test Kit: