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## MOLD CLEANUP AFTER THE FLOOD

Flood water has devastated many regions in New York State. Although the local floodwaters have receded, the clean-up and recovery period is just beginning. A pervasive after effect of the presence of excessive moisture is the growth of mold in buildings and homes.

Molds can usually be detected by a musty odor and discoloration of surfaces. Molds grow on organic materials such as paper, leather, dirt, and soap scum. They grow best at warm temperatures, but they can grow over a large temperature range. If you see or smell mold, you have a problem. The Extension Disaster Education Network ([www.eden.lsu.edu](http://www.eden.lsu.edu)) provides the following recommendations about the cleanup of mold.

### **Cleanup and Removal of Mold**

People can experience health effects when exposed to mold even if it is dead, so it must be removed. Killing it by applying a biocide such as chlorine bleach does not minimize health risks. Because mold spores are very small and can be easily inhaled, it is not safe to inhabit buildings with high mold levels.

Anyone spending more than a brief time cleaning in a moldy environment should use a HEPA filter or N95 rated mask; typically it will have two straps. Also, use gloves.

Porous materials should be thrown out or completely decontaminated if they are moldy. Materials such as hard plastic, glass and metal can be cleaned. Remove the mold from non-porous materials using a soap and detergent. **Never mix bleach and ammonia.**

Disinfect structural members that have been cleaned by applying a solution of 1 cup chlorine bleach per 1 gallon water or follow manufacturer's recommendations. The surface should be thoroughly wetted with the solution. Keep the surface wet with bleach solution for 10 to 15 minutes to kill the mold. Allow the solution to dry naturally 6 to 8 hours. The area must be well ventilated since bleach fumes may cause lung irritation. Remember that chlorine deactivates termite treatments. After cleanup, termite treatments should be reapplied.

Other products that kill mold are biocides. These biocides have Environmental Protection Agency (EPA) registration numbers on the bottle and instructions for the intended application.

### **Methods to Remove Mold from Various Products**

Always clean surfaces, removing the mold, before using a chlorine bleach solution. Bleach changes the surface color.

*Painted Surfaces Inside the Home:* Scrub moldy surfaces with a detergent. Do not mix bleach with cleaners containing ammonia. After the mold has been removed, discoloration can be removed using a solution of 1-cup chlorine bleach to 1-gallon water. Rinse with clean water and allow to dry thoroughly before painting or papering.

*Painted Exterior Surfaces:* Scrub mold on paint with a solution of 1/3 cup detergent that does not contain ammonia, 1 cup chlorine bleach and 1 gallon of water.

*Bathrooms:* Scrub surfaces with a solution of 1-cup chlorine bleach, 1 tablespoon detergent that does not contain ammonia and 1 gallon water. Keep the surface wet for about 10 minutes, then rinse well with water and dry.

*Roofs with Asphalt Shingles and Fiberglass Panels:* Use a mixture of 1-quart chlorine bleach, 1 ounce detergent, and 1 gallon water at the rate of 1 gallon per about 40 square feet. This solution will damage metal rain gutters and plants, so control runoff and rinse surfaces contacted by the solution.

*Wood Shingles, Decks and Other Untreated Wood:* Scrub surfaces with a solution of 1-quart chlorine bleach and 1 ounce detergent in 1 gallon water. Rinse thoroughly. If stains remain, increase the concentration of bleach to water and re-treat. Allow wood to dry thoroughly before painting or enclosing.

*Clothing and Other Textiles:* Brush, shake, sun and air mildewed textiles outdoors. Launder washable items with detergent and chlorine bleach when appropriate.

*Leathers:* Dyes used on leathers are very sensitive to numerous substances. Moisten a cloth with a solution of 1 cup denatured alcohol to 1 cup water, wipe away visible mold and dry in circulating air.

*Carpet and Rugs:* Discard pads containing mold. It is nearly impossible to remove all the mold in a pad. Carpet should also be discarded except for minor mold infestations. It is best to hire a professional carpet cleaner or restorer to clean wall-to-wall carpet. If you try to save the carpet yourself, apply rug shampoo with a carpet shampooer according to manufacturer's directions. Expose mold growing on the back of carpet to the direct rays of the sun. Scrub the back of the carpet using a detergent. Paint the carpet backing with a solution of ¼ teaspoon chlorine bleach to 1-cup water or another sanitizing product applied according to the label directions. Rinse several times. After shampooing and sanitizing, dry the carpet or rugs quickly by laying outdoors in the sun and wind, or use fans to speed drying.

*Upholstered Furniture and Mattresses:* If occupants are not sensitized to mold, very minor mold infestations may be tolerated in upholstered furniture and mattresses. Brush surface mold away with a broom outdoors. Vacuum outdoors or use a vacuum with a HEPA filter bag. Discard the disposable vacuum cleaner bag. Use the services of a professional upholstery cleaner, or sponge the item with detergent suds and wipe with a clean cloth. Avoid getting the stuffing wet. Wipe the furniture with a cloth moistened with a solution of 1 cup denatured or rubbing alcohol to 1 cup water and dry thoroughly. Place the item in the sun for a few hours and air it thoroughly or use a fan and indirect heat to dry. If mold is growing into the fabric or in the padding of an upholstered piece, nothing will eliminate the mold or odor except renovation or replacement.

*Books:* Stand books on end. Spread out pages to dry. Wipe off mold with a clean, dry cloth. After a few hours, stack and press to avoid wrinkling. Alternate opening and stacking until completely dry. Sprinkle talcum powder or cornstarch on pages to absorb moisture. Books may be frozen until you have time to work with them.

*Wood Furniture:* It is essential to differentiate between a little surface mold on the finish, and mold that has grown through the finish and into the wood. If there is extensive mold growth, the

wood should be sanded to remove the entire area of mold using appropriate personal respiratory protection or another method used to remove the mold. Caution should always be used when refinishing wood furniture that has been exposed to mold. Whenever possible these items should be replaced rather than repaired.

## **Drying Out Before Rebuilding**

*The problem:* Wood submerged in water will absorb a large amount of water. Rebuilding too quickly after a flood can cause continuing problems such as mold growth, insect infestations, and deterioration of the wood and wall coverings.

*How long until it's dry?* It may take weeks for the wood to be adequately dry to close a wall. The drying time will vary depending on the initial moisture content and the drying conditions.

*How can I tell if it's dry enough?* **Solid Wood Framing:** The moisture content of wood framing members such as wall studs, floor and ceiling joists must be tested with moisture meter. Wood always holds some moisture, but in our region of the country it is considered dry enough to build or re-build with if no individual piece of wood has a moisture content greater than 14% and the average moisture content of all the wood framing members is not greater than 12%. An average moisture content can be obtained by random sampling at least 10% of each component. So for example, if there are 100 wall studs, then the moisture content of at least 10 wall studs (selected at random at different spots in the house) should be tested. And if any individual stud has a moisture content higher than 14%, the structure should continue to be dried out. If the average moisture content of all the studs collected is above 12%, the structure should continued to be dried out.

**Gypsum board, plywood floors and other building materials:** Unlike solid wood framing, the dryness of gypsum board, plywood and other building materials must be confirmed qualitatively by comparing readings between like materials in affected areas of the building and unaffected areas of the building. While gypsum wall board that was saturated with flood waters should be removed and thrown out, some areas of the house may have wallboard that did not get wet from flood water. But there is a chance it may have picked up excessive amounts of moisture from the air or due to capillary action. Therefore the moisture content of remaining wall board on same floor as affected area should also be tested. Materials in the affected area are presumed dry when their moisture content readings are within 5% of similar materials in unaffected areas (for example, test materials in a room on the second floor well away from flood waters, or in a nearby building unaffected by flooding) when taken with an intrusive/penetrating moisture meter. A non-intrusive/penetrating meter may also be used, but keep in mind that readings from non-intrusive meters are less accurate than those from intrusive meters.

## **How Can I Dry Things Out?**

It is important to remember that each of these procedures works best in certain situations; these depend very much on your climate. In areas with higher humidity, using central air systems and dehumidifiers will most likely be the most effective methods to drying out your belongings and home.

*Ventilation:* Ventilation is usually the best way to dry things out and can remove several gallons of water per day. Provide an entrance and exhaust opening for air to promote cross-ventilation. Place a fan in a window or door with the fan facing to the outdoors. Seal the rest of the opening with cardboard, plywood or blankets so the fan can create a vacuum. Use fans to circulate air over wet surfaces. Face fans into corners or other hidden areas.

*Heat:* Heat increases the moisture-holding ability of the air. Use your furnace or large heaters to heat the air. Small space heaters will have little effect. As wood gets drier it may be helpful to heat the house for a few hours then ventilate to exchange moist air with dry air.

*Dehumidifiers:* A dehumidifier can be used if outside air is humid. Dehumidifiers function most efficiently at warm temperatures. At 80 degrees Fahrenheit and 6 percent relative humidity, most residential dehumidifiers will remove 1-2 pints of water per hour from the air.

Please visit our web site <http://counties.cce.cornell.edu/delaware/> for other fact sheets and links regarding this topic, or you may contact our office at 607-865-6531.

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