



# Post-Flooding Considerations and Mold<sup>1</sup>

The appropriate response to an unplanned “water event”—such as a broken pipe, sewage back-up, or severe weather such as a hurricane—can mean the difference between a minor inconvenience and long-lasting damage to a home and its contents. In addition to the time and cost associated with restoring the home, you should also be aware that serious indoor air quality problems might occur as the result of mold. The following information is intended to outline areas for consideration when dealing with post-flooding problems in residential structures and is not inclusive of all situations. Keep in mind this fact sheet is only an overview. Access and read the references and resources listed at the end of this document to become more familiar with the topic and the requirements of practitioners in this field.

## First Steps (dependent on severity of the situation)

- Safety is the first priority in any water event.
- Examine the home for structural damage, downed utility lines, and broken water lines before commencing with a plan of work. Priorities will vary depending upon the type of damage and how serious it is.
- Contact utility companies promptly, and shut off water, gas and electricity before commencing work.

- Ventilate the structure.  
Fresh, moving air discourages growth and amplification of microorganisms. If power is out, open windows and doors, and air the structure out thoroughly during daylight hours. It is highly recommended that ventilation be maintained during the restoration effort. Dehumidifiers, with hoses that connect to drains, along with wet vacs and fans may also be of help. If using portable fuel-powered generators to power drying equipment, be sure to operate them outside of any structure to avoid carbon monoxide poisoning and possible deaths. Depending on the severity of the problem, do *not* use the HVAC system to dry the area initially; contaminants and mold can spread through the circulation of moist air.
- Use Personal Protective Equipment (PPE) for dirty water or problems over 48 hours old.  
This may include a disposable respirator (N95 is the minimum recommended protection against mold spores), disposable outer protective wear, proper gloves, and eye protection. Always don protective gear before entering a flooded building, and when handling water-damaged materials, to avoid dangerous exposures to infectious diseases, molds and bacteria.

<sup>1</sup>*DISCLAIMER – This piece is intended to give the reader only general factual information current at the time of publication. This piece is **not** a substitute for professional advice and should not be used for guidance or decisions related to a specific design or construction project. This piece is not intended to reflect the opinion of any of the entities, agencies or organizations identified in the materials and, if any opinions appear, are those of the individual author and should not be relied upon in any event.*

- Make sure the home’s occupants know what you’re doing, and why. (For example, a helpful—but untrained—family member might turn on the AC to speed up the initial drying-out process.)
- Take photos or videotape the damage before beginning remediation measures.
- Determine the size and extent of the water-damaged area.

For example, the New York City Department of Health (DOH) has written guidelines recommending safe practices in remediating water- and mold-contaminated environments, including the HVAC system. The guidelines identify five levels of contamination based upon the size of the area contaminated (see table below).

Note that the U.S. Environmental Protection Agency also has general guidelines, based on the area and type of material affected by water damage and/or mold growth, and that they are available at <http://www.epa.gov/iaq/molds/images/moldremediation.pdf> in their publication *Mold Remediation in Schools and Commercial Buildings*, which can also apply to residential structures.

- Assess the water quality Determine its “cleanliness category”. According to the Institute of Inspection, Cleaning and Restoration Certification

(IICRC) *Standard and Reference Guide for Professional Water Damage Restoration* (IICRC S500), there are three categories of water that cause damage in buildings. They are summarized as follows:

- **Category 1 (Clean water):** Water that is clean at the releasing source and does not pose a hazard if consumed by humans. Time and temperature, which promote the growth and amplification of microorganisms in water, can cause Category 1 water to degrade.  
Examples: burst water pipes, failed supply lines on appliances, vertically falling rainwater.
- **Category 2 (Gray water):** Defined as water that begins with some degree of contamination and could cause sickness or discomfort if consumed by humans. As with Category 1 water, time and temperature can cause Category 2 water to become progressively more contaminated.  
Examples: discharge from dishwashers, washing machines, broken aquariums.
- **Category 3 (Black water):** Water that is highly contaminated and could cause death or serious illness if consumed by humans. Black water can also contain harmful chemicals, pesticides, or medical wastes.

Classification	Size of area	Example
Small isolated areas	10 sq. ft. or less	Ceiling tiles, small areas on walls
Mid-sized isolated areas	10–30 sq. ft.	Individual wallboard panels
Large isolated areas	30–100 sq. ft.	Several wallboard panels
Extensive contamination	>100 contiguous sq. ft	Large areas
Remediation of HVAC systems	Small isolated areas of contamination (<10 square feet)	
	Larger areas of contamination (>10 square feet)	

Examples: sewage, sea water, rising flood water from rivers and streams, ground surface water flowing horizontally into homes.

## Cleanup (dependent on severity of the situation)

- Act quickly. If the affected area can be dried out within two days of becoming wet, mold probably will not grow to a great extent. Keep in mind that molds are a natural part of the environment, and are always present. However, when conditions are right their growth amplifies.
  - It is important to take quick action to prevent continued damage and to eliminate the growth of mold. Assess the extent of damage and types of damaged materials, and form a plan for clean up.
- Remove standing water. If exterior water is entering the home, take steps to prevent further water intrusion and secure the exterior of the house.
- Contact professionals as needed: electrician, plumber, carpenter, roofer, mechanical contractor, water extraction company, and/or mold mitigation company. If you are bringing in outside help, make sure they are properly trained, and experienced in water damage and/or mold remediation. It is their responsibility to ensure the methods they use are adequate.
- Be sure that your plan addresses the safety of workers, the home's occupants, and its visitors.
  - Move wet or unsalvageable materials out of the home. *Do not* transport debris through unaffected areas. Keep contaminants and mold from spreading to uncontaminated areas of the home.
  - Remove items that cannot be washed or cleaned.
- Remove and dispose of all drywall, paneling or other wall materials up to a point 12–24" above the waterline visible on the wall.
  - Look for evidence of moisture wicking materials.
  - Remove and dispose of wet insulation materials.
  - Leave only wall framing components that are durable and minimally porous (such as wood studs not affected by rot), which can be cleaned.
- Remove and dispose of floor coverings; carpet, cushion, pad, felt, and sheet vinyl laminate, or tile floor materials. Porous floor materials (including concrete and cement) may absorb considerable quantities of water and contaminant, and non-porous materials may trap moisture and prolong drying. See IICRC S100 *Standard and Reference Guide for Professional Carpet Cleaning* for detailed information.
- Dispose of waste material safely.
- Clean first, then disinfect (depending on type of water and other factors).
  - Since many biocides are inactivated by quantities of organic contaminants, cleaning should always precede biocide application (if disinfection is required).
  - Anyone using a chemical cleaner, mildew inhibitor, detergents etc., is cautioned to read carefully and follow the instructions, in order to know what the product is expected to do and precautions to follow when using it. Be aware that mixing certain types of products can produce toxic fumes, and result in injury and even death. Do not use fungicides developed for use outdoors for mold remediation indoors.

## Mold Identification

Mold can be recognized by:

- **Sight:** Are the surfaces of walls and ceiling discolored? Mold can appear as a splotchy discoloration ranging from white to orange, and from green to brown to black.
- **Smell:** Mold cannot always be seen; however, it can be identified by a bad odor, such as a musty, earthy, or foul smell.

There are four things essential for fungal growth:

1. The presence of fungi (spores)
2. Suitable nutrients (organic materials to feed upon)
3. The proper temperature (between 40° and 100° Fahrenheit)
4. Moisture (without moisture, there is no mold problem)

“Organic materials” includes a very wide range of substances, including obvious ones such as wood (including wood in cabinetry and furniture), and wallpaper; and not-so-obvious ones such as the paper facing on drywall, insulation, glues used to bond carpet to its backing, flooring adhesives, and in some instances even polyvinyl products. While mold cannot obtain nutrients from inorganic materials—such as concrete, glass and metal—it *can* grow on dirt or skin oils present on these surfaces.

## Mold Remediation

“Mold remediation” means removing the mold, to prevent human exposure and damage to building materials and furniture. It is necessary to *clean up* mold contamination, not just kill the mold; dead mold is still allergenic, and some dead molds are potentially toxic.

Agencies differ on their recommendations for cleaning up mold. Many people recommend a solution of automatic dishwasher detergent and hot water. 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 immune-compromised individuals will be residing in the home or when the flood water in the home is classified as “gray” or “black”).

The presence of organic (humic) materials, the pH (acidity/alkalinity) of the water, the surface material and contact time affect the effectiveness of bleach for disinfection. The most compelling reason for advising against bleach is that cancer-causing substances can be formed by the reaction of bleach with organic materials. In addition the fumes are harmful.<sup>1</sup>

The EPA (U.S. Environmental Protection Agency) has a “Checklist for Mold Remediation” in their publication *Mold Remediation in Schools and Commercial Buildings*, which is a very useful reference for residential mold remediation.

Extensive contamination should be assessed by an experienced health and safety professional and remediated by personnel with training and experience in handling environmentally contaminated materials.

Call the Florida Department of Health (800-543-8279) or call your local Florida Department of Health contact for more information (a list is available at <http://www.doh.state.fl.us/chdsitelist.htm>).

## Drying Structural Components

Dry exposed structural components with plenty of air circulation, while maintaining constant ventilation.

- If possible, take advantage of low humidity outside.
- Use oscillating or box fans, repositioning them around the home every few hours.

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<sup>1</sup> Canada Mortgage and Housing Corp.

- Avoid temperature extremes that might slow drying, or promote microorganism growth. The longer the materials are wet, the greater the potential for primary structural damage, secondary humidity damage, microbial growth, and possible subsequent indoor air quality problems.
- Dry all electrical fixtures and inspect for damage.
- If the building has had mold which has been removed, before turning on the HVAC system have it cleaned by a maintenance service professional experienced in mold clean up.

### Reconstruct

- Leave cleaned structural surfaces exposed to fresh air until you are sure that they have returned to normal moisture content. Depending upon the amount of water exposure, complete drying can take days or even weeks.
- Moisture meters may be helpful for measuring the moisture content in a variety of building materials.
- Reconstruct or replace components as required. Be sure to restore affected areas according to all applicable Local, State and Federal building codes.

### Conclusion

- The best cure for mold damage is prompt cleaning and drying. Proper maintenance and timely repair of water-damaged areas is the key to preventing contamination in the home.
- Use the simplest and safest methods possible for proper removal of mold, given the particular situation.
- In all situations, the underlying cause of water accumulation must be permanently dealt with, or mold growth will recur.

### References and Resources:

Canada Mortgage and Housing Corporation, About Your House CE 08, *Fighting Mold- The Homeowners' Guide*. [www.cmhc.ca](http://www.cmhc.ca)

Canadian Construction Association, CCA-82-2004 Mould Guidelines for the Canadian construction Industry. [www.cca-acc.com](http://www.cca-acc.com)

Florida Department of Health (800) 543-8279 or call your local Florida Department of Health contact for more information ( list is available at [www.doh.state.fl.us/chdsitelist.htm](http://www.doh.state.fl.us/chdsitelist.htm))

*IICRC Reference Guide for Professional Mold Remediation* (IICRC S520) 2003,2004. [www.iicrc.org](http://www.iicrc.org)

*IICRC Standard and Reference Guide for Professional Carpet Cleaning* (IICRC S100). 2002. [www.iicrc.org](http://www.iicrc.org)

*IICRC Standard and Reference Guide for Professional Water Damage Restoration* (IICRC S500) 1999. [www.iicrc.org](http://www.iicrc.org)

Kimbrough, James. *Molds, Mildews, Mushrooms, & Man*. University of Florida. [www.angelfire.com/wizard/kimbrough/Textbook/table\\_of\\_contents.htm](http://www.angelfire.com/wizard/kimbrough/Textbook/table_of_contents.htm)

New York City Department of Health & Mental Hygiene Bureau of Environmental & Occupational Disease Epidemiology. 2002. *Guidelines on assessment and Remediation of Fungi in Indoor Environments*. [www.nyc.gov/html/doh/html/epi/moldrpt1.shtml](http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml)

U.S. Environmental Protection Agency, Office of Air and Radiation, Indoor Environments Division. *Mold Remediation in Schools and Commercial Buildings*. EPA 402-K-01-001 March 2001. [www.epa.gov/iaq/molds/index.html](http://www.epa.gov/iaq/molds/index.html)

U.S. Environmental Protection Agency web site [www.epa.gov/iaq](http://www.epa.gov/iaq) or call EPA's Indoor Air Quality Information Clearinghouse at (800) 438-4318

Yost, Nathan MD Lstiburek, Joseph Ph.D,  
Brennan, Terry “What You Need To Know  
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[www.buildingscience.com/resources/mold/default.htm](http://www.buildingscience.com/resources/mold/default.htm)

**Don't know where to go for an answer  
to a specific question?**

Contact: Building A Safer Florida, Inc. 1-850-  
222-2772 or [www.buildingasafeflorida.org](http://www.buildingasafeflorida.org)

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