

WATER INTRUSION RESPONSE PROCEDURE

PURPOSE/DISCUSSION

There has been much concern in the media and the public in recent years concerning exposure to mold^A in homes, schools, and commercial buildings. Mold spores are all around us and are found indoors and outdoors in most settings year-round. The key to controlling exposure to mold spores in the indoor environment is controlling moisture. This document will provide detailed procedures for responding to the causes of water intrusion events including spontaneous plumbing and roof leaks, preventative maintenance, and what to do when suspect mold growth is discovered.

Personnel involved in this process should be familiar with both the EPA “Mold Remediation in Schools and Commercial Buildings”^B document and the IICRC S520 Standard and Reference Guide for Professional Mold Remediation.^C

1. What to do after discovery of a water intrusion (flooding) event

1.1. STOP THE WATER

- 1.1.1. Call the Maintenance Department or 911 (if after hours) immediately. Large floods may require a professional water restoration company. Having prior approval and contracts with two or three such companies makes this process easier.
- 1.1.2. Shut off the water flow if the problem is a plumbing or irrigation issue. If the water is **not** clean (i.e. a sewer or clogged toilet backup), **do not** attempt to clean up the damage. Contaminated water may contain bacteria, necessitating special protective equipment and procedures not covered in this document.
- 1.1.3. If the issue is a roof leak and the rain is persistent or on-going, tarp the building. If the rain has stopped or is not likely to return, do not tarp the roof.
- 1.1.4. Notify your insurance provider.

1.2. DRY OUT THE WET FURNISHINGS

- 1.2.1. **Carpet** may be salvaged and dried if action is taken within 24-48 hours of the flood and the water is clean. Determine whether padding underneath the carpet is present and if it is wet. Determine whether wooden subfloors or concrete are wet. Lift cardboard boxes off the floor and inspect for damage. Equipment needed for large-scale projects may include the use of moisture meters, air movers, dehumidifiers, fans, and wet vacuums/extractors. See the photos of assessment and remediation tools at the end of this document. If

^A “Mold” is used here as a general term to describe fungal growth. In fact, molds are only one group of the Kingdom Fungi. “Fungi” is a general classification for spore producing organisms that are usually classified as “plants that lack chlorophyll” – that is, they are not photosynthetic. Fungi include molds, rusts, smuts, mildews, mushrooms, and yeasts.

^B EPA 402-K-01-001. March 2001.

^C Institute of Inspection, Cleaning, and Restoration Certification S520, First edition, December 2003.

mold growth is visible on the carpet due to long-term wetness, the carpet and padding should be removed and discarded.

- 1.2.2. **Drywall** will absorb water several inches above floor level and baseboards; wallpaper – vinyl types in particular – will retain moisture in the drywall, permitting mold to grow if not quickly dried out. Measure moisture levels in the drywall behind the baseboard and near the floor. Levels above 15% moisture indicate that the walls must be actively dried^D. It may be possible to dry the walls in place by drilling quarter-sized holes in the walls at baseboard height in each stud bay. Vinyl wallpaper should be pulled up or removed to allow the wall to dry. If holes are drilled, and the walls are dried below 15% moisture within 48 hours, then the baseboard may be replaced. Extensive moisture damage may require that the drywall be cut out and replaced. Areas that have been wet less than 48 hours may be salvaged; areas that were wet more 48 hours may still be salvageable pending review by a Certified Industrial Hygienist.
- 1.2.3. **Wet, soft porous items** such as ceiling tiles, cardboard boxes, paper, books, stuffed animals, pillows, etc., should be discarded. Valuable books may be saved, but the procedure is expensive. Itemize and photograph all discarded items for insurance and replacement purposes. Clothing and blankets can be laundered in hot water and dried.
- 1.2.4. **Hard Cleanable Items** such as furniture, cabinets, plastic toys, etc., can be wiped with a sanitizing wipe and dried.

2. What to do when you see suspect mold growth.

Indication of a long-term moisture problem.



2.1. How much visible mold is present?

- 2.1.1. **Less than 10 square feet** – Maintenance staff can clean up small amounts of mold growth using diluted bleach ($\frac{3}{4}$ cup household bleach in 1 gallon water)^E or disinfecting wipes. Measure the moisture content of the wall and decide if material should be removed and replaced. Decide whether **and how** to open up the wall or ceiling for inspection. The cause of the mold growth must be determined as part of the remediation. Steps for preventing mold growth are discussed below. All remediation work should be done in unoccupied areas.
- 2.1.2. **Between 10 and 100 square feet** – is considered extensive mold growth that requires more than just cleaning. Consult with a Competent Professional such

^D Active drying is the concept where warm, dehumidified air is blown onto or into a wet or moist item or wall cavity to facilitate or accelerate the drying process.

^E If a bleach solution is used, care should be taken to ensure that no bleach or bleach solution comes in contact with ammonia containing chemicals. Bleach containers must list the EPA Registration number on the label.

as a Certified Industrial Hygienist (CIH) with experience in mold remediation. The Competent Professional will assess the situation and provide a remediation plan and Scope of Work. This plan can be used to solicit comparable bids from contractors.

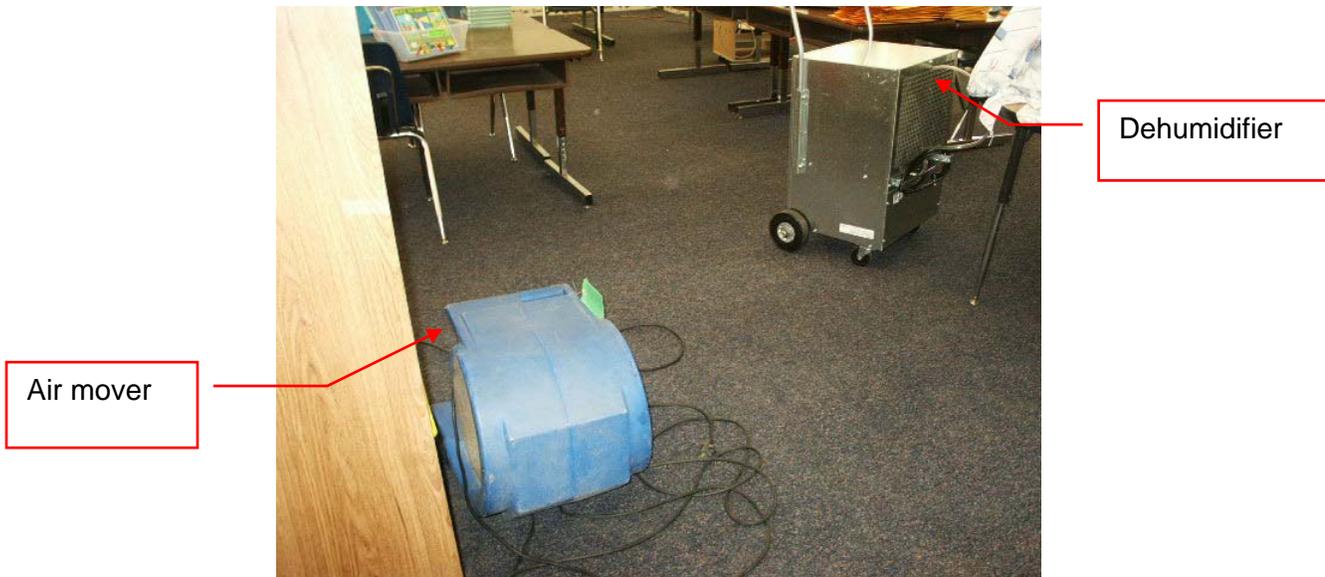
- 2.1.3. **Over 100 square feet** – is considered a large project requiring full containment, extensive personal protective equipment (PPE), air cleaning devices (negative air machines) and the services of an experienced mold remediation contractor. Evacuation may be required based on a visual assessment by a Competent Professional. To avoid a conflict of interest, the company providing the assessment should not have an interest in the remediation company.
3. **Is mold dangerous or toxic?** “Most people will have no reaction at all when exposed to molds. The symptoms that are attributed to mold exposure can also be due to other causes such as bacterial or viral infections, or other allergies.”^F Approximately 5 to 10% of the population is allergic to some mold species. Individuals with known mold allergies should not work on mold remediation projects and may need protection from excessive mold growth. However, “the mere presence of any material, including molds, does not mean that exposure has occurred or will occur.”^G
4. **Building complaints with no visible mold growth:** Building-related complaints alleged to cause health-related issues should be reported to the Risk Manager as soon as possible. Employee complaints should be taken seriously and investigated thoroughly. The Facilities or Maintenance Department is the first responder and can visually inspect the area of concern for water intrusion, suspect hidden mold growth, odors, or ventilation problems. A written report of findings should be provided to the Risk Manager and Director of Facilities/Maintenance. If the problem is not resolved, then additional support from an outside consultant may be necessary. In cases of building-related health concerns, there are many sources other than mold that must be investigated. In approximately 50% of investigations, the area of concern has insufficient ventilation for the occupants of the space. A Heating, Ventilation, and Air-Conditioning (HVAC) specialist should inspect the air-handling equipment. Other issues may include chemicals, ozone, noise, lighting and stress.
5. **Employee Training:** Employees evaluating and remediating water intrusion events and mold growth must have training in cleaning, drying, visual inspections, and the hazards of potential mold exposure (Title 8, California Code of Regulations (CCR) 5194). Maintenance workers should receive training as outlined in “Guidelines for the Protection and Training of Workers Engaged in Maintenance and Remediation Work Associated with Mold.”^H
6. **Employee PPE:** Drywall removal and any work that generates airborne dust may require that the employee wear a respirator such as an N95 dust mask. Half-face respirators may be required when working on large projects. Employees will be issued dust masks and will have a medical evaluation for respirator use. Employees approved for respirator use will receive fit testing and annual training in the use and care of the respirator as part of the Employer’s Respirator Training program (Title 8, CCR 5144).

^F American Industrial Hygiene Website. The Facts About Mold posted May 28, 2002. (www.aiha.org)

^G “Assessment, Remediation, and Post-Remediation Verification of Mold in Buildings” AIHA Guideline 3-2004

^H Edited by the National Clearinghouse for Worker Safety and Health Training. (www.wetp.org)

7. **Mold Sampling:** Visual mold growth inside a building is not desirable and should be remediated. In most cases, if visible mold growth is present, sampling is often unnecessary¹. In some cases, especially large-scale projects, it may be beneficial to identify the type of mold species and the levels of indoor mold spores. This decision is best made by a Competent Professional experienced in the collection and interpretation of mold samples. Since mold spores are ubiquitous and a natural part of our outdoor environment, indoor levels must be compared to outdoor levels at the time of sampling. Interpretation of airborne spore level results is a challenging task because there is a wide variation in mold spore levels and there are currently no established exposure limits. In most healthy buildings, the levels indoors will be less than outdoors and contain the same spore types.
8. **Can mold be managed in place?** There may be situations where mold growth is present inside a wall or on a structural beam or firewall precluding removal. There are strategies for encapsulation and management in place. In this situation, the Competent Professional will most likely utilize air sampling to show that indoor spore levels support the decision permitting management in place.
9. **Post-remediation verification:** It is necessary to verify that the mold remediation company has removed or encapsulated all the visible mold growth. The Competent Professional may decide to collect air and surface samples after the contractor has removed all visible growth and prior to taking down containment structures. The Competent Professional should follow recommendations in the AIHA Guideline 3-2004 document "Assessment, Remediation, and Post-Remediation Verification of Mold in Buildings."



¹ "A Brief Guide to Mold in the Workplace" U.S. Department of Labor. October 2003 (www.osha.gov)

10. Tips for Preventing Mold Growth and Improving Indoor Environmental Quality

- Address building-related complaints promptly!
- Fix leaky roofs, windows, etc. Watch for condensation & wet spots.
- Empty roof gutters of plant debris and maintain building rainwater collection systems.
- Clean and Maintain food storage areas
 - Refrigerators
 - Microwaves
 - Water Coolers
 - Soda Machines
- Consider replacing carpeting with hard floors that can be easily dried
- Clean with a HEPA vacuum nightly
- Remove cobwebs, dust, and clutter
- Use step off mats on the exterior of doors and at building entrances
- Run HVAC systems continuously while building is occupied (Fan “On” setting, not “Auto”)
- Change air filters regularly. Upgrade air filter efficiency if possible.
- Routinely inspect and clean HVAC equipment, condensate pans, coils, and supply and return registers.
- Regularly verify that the fresh air intake is operating properly
- Do not purchase Ozone Generators
- Under appropriate supervision, apply pesticides and other hazardous chemical treatments after school or business hours on Friday afternoons. Do not apply near HVAC air intakes.
- Do not allow drain traps in sinks and floors to dry out & draw in sewer gas.
- Vent combustion appliances directly to the outdoors
- Keep trees, shrubs, and sprinkler heads at least 3 feet away from buildings
- Do not permit sprinklers to spray onto exterior walls; ensure that after-hours irrigation patterns are what is intended
- Do not over water – soil against buildings should dry completely within 3 hours of watering
- Ensure that water and rain drains away from buildings
- Do not permit rodents, birds, or insects to nest in or around buildings
- Do not locate exhaust stacks near fresh air intakes
- Do not over water indoor plants
- Remove Air Fresheners and unapproved cleaning products and pesticides

Table 1: Water Damage – Cleanup and Mold Prevention^J

Table 1: Water Damage - Cleanup and Mold Prevention	
Guidelines for Response to Clean Water Damage within 24-48 Hours to Prevent Mold Growth*	
Water-Damaged Material†	Actions
Books and papers	<ul style="list-style-type: none"> • For non-valuable items, discard books and papers. • Photocopy valuable/important items, discard originals. • Freeze (in frost-free freezer or meat locker) or freeze-dry.
Carpet and backing - dry within 24-48 hours§	<ul style="list-style-type: none"> • Remove water with water extraction vacuum. • Reduce ambient humidity levels with dehumidifier. • Accelerate drying process with fans.
Ceiling tiles	<ul style="list-style-type: none"> • Discard and replace.
Cellulose insulation	<ul style="list-style-type: none"> • Discard and replace.
Concrete or cinder block surfaces	<ul style="list-style-type: none"> • Remove water with water extraction vacuum. • Accelerate drying process with dehumidifiers, fans, and/or heaters.
Fiberglass insulation	<ul style="list-style-type: none"> • Discard and replace.
Hard surface, porous flooring§ (Linoleum, ceramic tile, vinyl)	<ul style="list-style-type: none"> • Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary. • Check to make sure underflooring is dry; dry underflooring if necessary.
Non-porous, hard surfaces (Plastics, metals)	<ul style="list-style-type: none"> • Vacuum or damp wipe with water and mild detergent and allow to dry; scrub if necessary.
Upholstered furniture	<ul style="list-style-type: none"> • Remove water with water extraction vacuum. • Accelerate drying process with dehumidifiers, fans, and/or heaters. • May be difficult to completely dry within 48 hours. If the piece is valuable, you may wish to consult a restoration/water damage professional who specializes in furniture.

^J From the U.S. Environmental Protection Agency's "Mold Remediation in Schools and Commercial Buildings" document, EPA 402-K-01-001, March 2001 (www.epa.gov/mold/table1.html)

Wallboard (Drywall and gypsum board)	<ul style="list-style-type: none"> • May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace. • Ventilate the wall cavity, if possible.
Window drapes	<ul style="list-style-type: none"> • Follow laundering or cleaning instructions recommended by the manufacturer.
Wood surfaces	<ul style="list-style-type: none"> • Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.) • Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry. • Wet paneling should be pried away from wall for drying.
<p>* If mold growth has occurred or materials have been wet for more than 48 hours, consult Table 2 guidelines. Even if materials are dried within 48 hours, mold growth may have occurred. Items may be tested by professionals if there is doubt. Note that mold growth will not always occur after 48 hours; this is only a guideline.</p> <p>These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, or chemical or biological pollutants, then Personal Protective Equipment and containment are required by OSHA. An experienced professional should be consulted if you and/or your remediators do not have expertise remediating in contaminated water situations. Do not use fans before determining that the water is clean or sanitary.</p> <p>† If a particular item(s) has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.</p> <p>§ The subfloor under the carpet or other flooring material must also be cleaned and dried. See the appropriate section of this table for recommended actions depending on the composition of the subfloor.</p>	

Basic Assessment & Remediation Tools

1. **Moisture Meters** such as The Protimeter Surveymaster SM™ moisture meter (right) combine the conventional two-pin inspection method, with a noninvasive radio frequency technique. This enables the user to assess the moisture condition not only on the surface, but also at depth quickly and non-destructively. This item^K is approximately \$525 and is currently available at <http://www.emssales.net>. Other meters and sources are available.



2. **Wet-dry Vacuum or ShopVac:** Available at local home supply stores. These vacuums are designed to extract water from carpets and should not be confused with HEPA vacuums (High Efficiency Particulate Air) which may be used during clean-up or routine housekeeping.



3. **Air Moving Devices:** Such as the Windshear™ 3000 Air Blower, which has a 3-speed switch that permits airflow selection of 1600, 2000, and 2500 cfm for moisture control and a 3-angle airflow adjustment (0, 33, and 90 degrees). These cost about \$300 each. Simple floor or oscillating fans may also be useful.



4. **Dehumidifier:** Capacity and pricing varies. A unit capable of drying a typical 1,000-square-foot classroom is recommended.



^K The provision of product or vendor names for various products featured are not to be construed as an endorsement of any product pictured. The source names are merely provided as a reference to aid in the location of similar material.