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WATER INTRUSION RESPONSE PROCEDURE FOR MAINTENANCE & OPERATIONS CUSTODIANS/PLUMBERS

PURPOSE/DISCUSSION

There has been much concern in the media and the public in recent years concerning exposure to mold^A and bacteria in homes, schools, and commercial buildings. It is important to bear in mind that mold spores and bacteria are all around us – both indoors and out, in most settings year-round. The key to controlling exposure to mold spores and bacteria in the indoor environment is controlling moisture and cleanliness. This document will summarize procedures for responding to water intrusion events (such as 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 the following documents:

1. Environmental Protection Agency (EPA) "Mold Remediation in Schools and Commercial Buildings"^B
2. Institute of Inspection, Cleaning, and Restoration Certification (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. Shut off the water flow. If the water is **not** clean (for example, a sewer or toilet overflow), **do not** attempt to clean up the damage until proper equipment is available. Contaminated water may contain toxins, thereby necessitating special protective equipment and procedures.
- 1.1.2. If the issue is a roof leak and the rain is persistent, tarp the building. If the rain has stopped and is not likely to return, do not tarp the roof (this permits drying out).
- 1.1.3. Notify your risk manager and insurance provider. Large floods may require a professional water restoration company. Having prior approval and contracts in place with two or three such companies makes this process easier.

^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, Second edition, August 2008.

1.2. ASSESS THE CLEANLINESS OF THE WATER

- 1.2.1. Category 1 = Clean, sanitary water that does not pose substantial risk from exposure. Examples include the main water line, sinks, toilet tanks, and exterior sprinklers. No extra precautions are necessary.
- 1.2.2. Category 2 = Gray water, possible biological contamination that has the potential to cause discomfort or sickness to workers. Examples include leaks from sewage lines, toilets with some urine, dishwashers, and broken aquariums that may harbor bacteria such as Escherichia coli (E. coli). Personal Protective Equipment (PPE) is required.
- 1.2.3. Category 3 = Black water is grossly unsanitary water having the likelihood to cause discomfort or sickness to workers by contact. Workers should have hazardous material training and appropriate PPE. Examples include sewage, flooding from seawater or river water, or runoff from farms or industrial acreage.

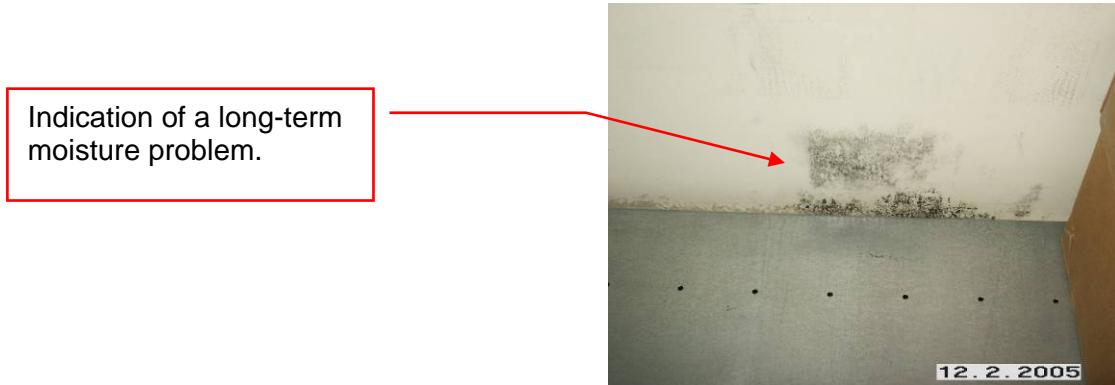
1.3. DRY OUT THE WET FURNISHINGS

- 1.3.1. **Carpet** may be salvaged and dried if action is taken within 24-48 hours of the flood and the water is clean (Category 1). 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 on Page 9 of this document. If mold growth is visible on the carpet due to long-term wetness (Category 2 or 3), the carpet and padding should be removed and discarded.
- 1.3.2. **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 16% moisture indicate that the walls must be actively dried^D. It may be possible to dry the walls in place (Category 1 water only) 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 competent Indoor Environmental Professional (IEP) such as a Certified Industrial Hygienist (CIH).
- 1.3.3. **Wet, soft porous items** such as ceiling tiles, cardboard boxes, paper, books, stuffed animals, pillows, etc., should be discarded. There are companies that specialize in saving water-damaged books and paperwork, 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.

^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.

- 1.3.4. **Hard Cleanable Items** such as furniture, cabinets, plastic toys, etc., can be wiped with a sanitizing wipe and dried.
- 1.3.5. **Materials contaminated with Category 2 or 3 water most likely will need professional assessment prior to cleaning or disposal.**

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



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 ($\frac{1}{4}$ cup household bleach in 1 gallon water)^E or disinfecting wipes. Disinfectants approved by the EPA to treat biological hazards should also treat minor bacterial contamination. 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 an IEP with experience in mold remediation. The IEP 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 IEP. To avoid a conflict of interest, the company providing the assessment should not have an interest in the remediation company.

3. Is mold/bacteria 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

^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.

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

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 Bacteria are present on all surfaces (including our skin) and generally pose no harm since bacteria are a normal part of a healthy body. Certain viruses and strains of bacteria related to sewage are more harmful and do pose a potential hazard.

4. **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 Workers dealing with Category 2 and 3 events should also have bloodborne pathogen training as outlined in Cal/OSHA Title 8 CCR § 5193. Workers dealing with Category 3 events should have hazardous waste (HAZWOPER) training as outlined in Title 8 CCR § 5192. Note: this EESC response document does **not** cover the PPE or the hazards of Category 3 water.

5. Employee PPE:

- 5.1. **Airborne Dust and Mold Spore Hazard Protection:** 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 mold remediation projects. Employees who are issued dust masks will have a medical evaluation and training 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).
- 5.2. **Biological (Bacteria) Hazard Protection:** Employees cleaning up Category 2 dirty water shall wear rubber shoe/boot coverings, rubber/latex gloves, and eye protection. If there is blood, vomit, or feces in the water, there may be Hepatitis or HIV virus present; employees handling the clean-up should have bloodborne pathogen training. Employees should be informed of available immunizations and discuss potential hazards with their physicians.

6. Biological Sampling:

- 6.1. 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 unnecessary^I. 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 Indoor Environmental Professional (IEP) such as a Certified Industrial Hygienist (CIH) 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 wide variation in mold spore levels and there are currently no established exposure

^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)

^I “A Brief Guide to Mold in the Workplace” U.S. Department of Labor. October 2003 (www.osha.gov)

- limits. In most healthy buildings, the levels indoors will be less than outdoors and contain the same spore types.
- 6.2. Sampling for bacteria from sewage backups is done by swabbing with sterile collection devices. The laboratory analysis will determine the presence or absence of E. coli. Sampling should occur **after** the floors have been cleaned and disinfected and thoroughly dried.
7. **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 IEP will most likely utilize air sampling to show that indoor spore levels support the decision permitting management in place.
8. **Post-remediation verification:** It is necessary to verify that the mold remediation company has removed or encapsulated all the visible mold growth. The IEP may decide to collect air and surface samples after the contractor has removed all visible growth and prior to taking down containment structures. The IEP should follow recommendations in the AIHA Guideline 3-2004 document "Assessment, Remediation, and Post-Remediation Verification of Mold in Buildings" and "Recognition, Evaluation and Control of Indoor Mold."



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

- Address building-related complaints promptly!
- Fix leaky roofs, windows, etc. Watch for condensation and 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 high efficiency particulate air (HEPA) vacuum nightly.
- Remove cobwebs, dust, and clutter.
- Use step off mats on the exterior of doors and at building entrances.
- Run heating, ventilation, and air-conditioning (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 and 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; additionally, ensure that after-hour irrigation patterns do not hit walls.
- 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

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.
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, discard, and replace.Ventilate the wall cavity, if possible.

^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)

Table 1: Water Damage – Cleanup and Mold Prevention^K (continued)

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.

* 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.

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 remediaters do not have expertise remediating in contaminated water situations. Do not use fans before determining that the water is clean or sanitary.

† If a particular item has high monetary or sentimental value, you may wish to consult a restoration/water damage specialist.

§ 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.

^K 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)

Basic Assessment & Remediation Tools

1. **Moisture Meters** such as the Protimeter Survey Master 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^l is approximately \$525 and is available at <http://www.emssales.net>.



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 (high efficiency particulate air) vacuums 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. 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.



^l 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.

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