

# Moisture Management And Mold Remediation Protocols for Healthcare Facilities

## I. POLICY

It is the policy of (facility name) to comply with applicable standards and recommendations related to moisture management and mold remediation in healthcare facilities.

## II. PURPOSE

The purpose of this policy is to outline guidelines for the prevention, control of water intrusion and when necessary removal of mold contamination.

## III. PROCEDURE

### A. General Issues

1. Stop or correct the problem causing the water intrusion.
2. Relocate patients and clean or sterilized supplies from affected areas immediately.
3. Close off shared air space from affected areas during cleanup procedures. Seal off and block return air vents if rigid barriers are used for containment. Negative pressure in relation to patient care areas should be always maintained in work zones.
4. Inventory all water-damaged areas, building materials and furnishings, patient belongings, damaged clean and sterile supplies, and equipment. Special attention should be given to identify carpet under cabinets, furnishings, etc.
5. Utilize a moisture meter to identify the extent of water damage and to determine sufficient dryness (<20%) of absorbent structural items.
6. Document the type of water damage, i.e. clean water (potable sources), steam, unsanitary water (rain, ground water), or contaminated water (sewage).
7. Both the construction team and healthcare staff in immunocompromised patient care areas should be educated regarding the airborne infection risks associated with construction projects, dispersal of fungal spores during such activities, and methods to control the dissemination of fungal spores.
8. Active surveillance should be used to monitor for airborne infections (e.g., aspergillosis) in immunocompromised patients as appropriate during construction, renovation, repairs, and demolition activities.

*Note: If a steam leak is a cause of moisture damage, additional consideration for the chemicals added to the steam is needed. Even though steam is relatively clean, steam treatment chemicals may remain in the materials affected by the steam leak after the moisture has dried.*

### B. Sheetrock/Drywall

1. Remove and replace all water-damaged drywall and insulation if wet greater than 48 hours. Fans may be used to attempt drying the wall material within 24-48 hours before removing.
2. Sheetrock wet or damp by contaminated water should be disposed of immediately. Sheetrock that has been previously water damaged should be monitored. Sheetrock that has been

previously water damaged should be monitored for mold and disposed of if wet greater than 24 hours on a subsequent water intrusion.

3. Use a moisture meter and cut sheetrock at 12 inches to 48 inches above the water mark. Note: Molds reproduce by creating hyphae that are like tentacles that grow rapidly into porous materials. The hyphae may begin growing 24 hours after the moisture levels reach growth potential from water damage or high humidity. The longer the time in days from water damage to removal, the greater the amount of sheet rock that should be removed (i.e., 12-48 inches above the water mark).

4. When work is completed, turn the heat UP (if possible) and utilize dehumidifiers to dry the area.

5. Wet lathe and plaster will leach the minerals from the wall and form a chalky surface. The loose material on the surface will need to be removed under controlled conditions and surface allowed to dry. Controlled methods can range from personal protection to full abatement under negative air pressure conditions dependent on the extent of the damage. The dry surface can then be painted with an antimicrobial paint. (See Risk Assessment Guideline, Attachment II)

6. If the plaster/lathe wall develops a strong odor, with or without visible mold growth remove people from this area of the building. Eliminate the source of the water and replace the water-damaged plaster.

7. During replacement of the sheetrock, drywall, plaster/lathe, the following general procedures are recommended.

- a) Setup critical (air sealed) barriers to prevent airflow into clean storage, patient care, or general ventilation system.
- b) Create a negative air differential in respect to patient care and areas where patients or healthcare workers may traverse or patient-related supplies are stored.
- c) Use appropriate respiratory protection, gloves and coveralls for the workers.
- d) Handwashing and showering after work in the area is also recommended.
- e) Use work practices that minimize the amount of dust generated and mold particles becoming airborne.

### **C. Ceiling Tiles**

1. Remove and dispose of all wet ceiling tiles within 24-48 hours of water damage. The only exception would be if ceiling tile has become wet due to a small steam leak and shape of the tile has not been altered. In this situation the ceiling tile can be air dried and reused.

2. When the ceiling tile has been impacted by unsanitary water (>24 hours wet or previous water damage) or contaminated water, controlled methods should be utilized for prompt removal and disposal. (See Attachment II)

### **D. Electrical**

1. Consider all wet wiring, light fixtures, and electrical outlets to be shock hazards until they have been checked by a building inspector and/or electrician. Until then, turn the power off in the area of water damage. **(Note: Only approved persons knowledgeable about electrical shock hazards should shut the power off.)**

2. Replace all electrical circuit breakers, Ground Fault Interrupters (GFIs), and fuses that have become wet.

3. Switches and outlets that are wet can be cleaned and reused but, when in doubt, replace them.

4. All electrical motors, light fixtures, etc. that were wet need to be opened, cleaned and air dried by a qualified person. Before being put back into service, inspect the motors, light fixtures, etc. to ensure there **are** no visible moisture/water droplets.

### **E. Furniture**

1. Dispose of upholstered furniture that has become wet due to unsanitary or contaminated water.

2. Upholstered furniture damaged by steam leaks or direct contact with clean water should be dried within 24 hours and monitored for fungal growth and odors or discarded.

3. Hardwood furniture or laminate furniture whose laminate is intact should be air dried and cleaned with a detergent solution and rinsed with clear water and dried.

4. Laminate furniture experiencing delaminating should be disposed of because the pressed wood under the laminate absorbs water readily and is hard to dry.

5. Furniture made of particle board or pressed wafer board that has been saturated with water should be discarded. The exception would be if the furniture has become wet due to a steam leak or direct contact with potable water. In this situation the furniture can be dried and monitored closely for fungal growth/odor. If fungal growth occurs or the furniture develops an odor, the particle board/pressed wood furniture should be discarded.

### **F. Files/Papers**

1. Remove and dispose of nonessential wet files and paperwork. The exception again would be if the moisture was due to steam leaks; then these can be dried.

2. Essential paper wet from clear or steam-damaged areas should be moved to a location where it can be dried within 24-48 hours. If unable to dry within 24-48 hours, place in a plastic bag, seal, photocopy and discard.

3. Essential paper that is wet with unsanitary or contaminated water should be placed in plastic bags, sealed and frozen until copied and discarded or a conservator is contacted.

### **G. Carpet**

1. Any carpet that has been made wet or damp over a large area with contaminated or outside flood waters should be discarded under controlled negative air conditions in relation to healthcare workers and patients or patient care supply areas and the entire area should be disinfected with bleach and water (or hospital-grade detergent).

2. Carpet that has become wet from unsanitary water, steam leaks, and potable water leaks can be treated per the following steps.

a) Carpet wet less than 24 hours

(i) Remove all materials (e.g., furniture, file cabinets) from the carpet.

(ii) Extract as much water as possible from the carpet using wet vacuums.

(iii) Shampoo the carpet with a dilute surfactant.

(iv) Alternatively, follow label instructions. Soak with ¼ cup bleach to 1 gallon water solution. Maximum concentration: a solution of 1 part bleach to 9 parts water.

*Important Note: People may have a reaction to biocides. Often, quaternaryamine compounds will be used as a biocide/cleaning compound. The compound may reduce levels of bacteria, but is often ineffective in killing fungal spores. Commercial steam cleaning of carpet can be used in place of bleach. The vacuum system is housed in the truck and the water used to clean the carpet is heated near the boiling point.*

(v) Rinse and extract the carpet with clean water to remove detergent/bleach residues.

(vi) Dry the carpet within 24 hours of treatment. After work is completed, increase the room temperature and use commercial dehumidifiers, floor fans, or exhaust fans to aid in drying the carpet.

b) Carpet wet more than 48 hours

(i) If carpet becomes wet during the WINTER with clean water, the previous protocol can be used to manage the carpet and salvage it.

(ii) Drying the carpet is usually more difficult in the summertime and water damaged carpets in humid environments often do not dry adequately. Disposal of water-damaged carpets in humid environments is often the best option.

(iii) Discard if odor develops or persists.

## **H. Nonporous Hard Surfaces**

1. Mold removal for nonporous hard surfaces (e.g., steel)

a) Mix 1 cup bleach in 1 gallon of water.

b) Wash the item with the bleach mixture.

c) Scrub rough surfaces with a stiff brush.

d) Rinse the item with clean water. e) Dry the item or leave it to dry.

2. Cleaning hard nonporous surfaces to prevent mold growth

a) Wash the surface with soap and clean water.

b) Then disinfect with a mixture of 1 cup bleach in 5 gallons of water.

c) Allow to air dry.

## **I. Personal Protection**

1. If possible, remediation activities should be scheduled during off-hours when building occupants are least likely to be affected.

2. Use personnel trained in mold remediation procedures, equipped with appropriate respiratory and personal protection for mold remediation. (See Attachment II))

3. Negative air pressure enclosures may also be set up for limiting cross-contamination from damaged areas. Monitor so that negative pressure will not bring air in from more contaminated areas.

## **J. Environmental Testing**

1. Post cleanup clearance visual inspection should be conducted to ensure appropriate cleaning has been performed. This does not necessarily mean air samples. A visual inspection in conjunction with possibly some surface samples is more appropriate.

2. Reports of odors of mold should be investigated thoroughly by visual inspection (e.g., under sinks, enclosed areas) and by checking for previous reports or work requests of water damage.

## DEFINITIONS

CLEAN WATER - *Potable water*

CONTAMINATED WATER: *water that may have or is known to have unprocessed sewage.*

MOLD AMPLIFICATION: *is rapid fungal growth under optimum conditions (i.e., amount of free water available to mold spores for growth on a substrate) that results from the increased water activity (>24 hrs) and follows water migration.*

MOLD REMEDIATION/ABATEMENT: *includes both finding and fixing conditions allowing mold growth. Also includes steps to safely remove mold and water damaged materials.*

MOLDS: *(fungi) are part of the natural environment. All molds are fungi but not all fungi are molds. There are over 1000 species but most commonly found molds in the US associated with negative health effects from indoor environmental exposure are Aspergillus, Penicillium, Fusarium, Rhizopus, and Alternaria*

UNSANITARY WATER - *water whose source is from rain that has not been treated or tested for humans, or flood waters not contaminated by sewage or ground water infiltration.*

WATER INTRUSION: *shall be defined as any water-based liquid that is released in such a manner that it has absorbed into any building components. The components may include carpet, wood, drywall wall, ceiling tiles, or any porous materials that absorb and hold moisture. The water-based liquids shall include but is not limited to potable water, domestic hot water, reheat water, steam, steam condensation, sewage and rainwater. Liquid substances that may be classified as biological hazard shall be treated as a hazardous waste spill.*

### Step 1. Determine risk group by location:

### RISK GROUP

#### Low

Offices  
Administration  
Non-patient areas  
Parking Decks  
Library  
Maintenance Shops

#### Medium

On call sleep rooms  
and other sleeping  
areas  
Dining and vending  
areas  
Non-hazardous lab  
Clinical Storage  
Computer rooms  
Morgue  
Corridors between  
patient areas  
Depts. Not Identified  
Above

#### High

Patient care areas  
Dialysis  
Diagnostic areas (e.g.,  
gastrointestinal and  
bronchoscopy suites)  
Emergency  
Department  
Treatment areas  
Radiology  
Kitchen  
(Food preparation  
area)  
OR  
Labor and Delivery  
Pharmacy  
Clinical Lab  
Sterile Supply

**Step 2. Determine level of remediation measures based on area contaminated and risk group.**

**MOLD REMEDIATION MATRIX: RISK GROUP - AREA OF CONTAMINATION**

Parameter of Area Contaminated	Risk Group		
	Low	Medium	High
<b>Small Isolated Areas</b> < 30 ft <sup>2</sup> ceiling tiles, small areas on walls, or single wallboards	I	I	II
<b>Large Isolated Areas</b> 30-100 ft <sup>2</sup> (several wallboard panels)	II	II	III
<b>Extensive Involvement</b> > 100 ft <sup>2</sup> contiguous in an area	III	III	IV

**Step 3. Circle the measures applicable for the work.**

**LEVEL I (ITEMS 1-10)**

1. Work area shall be unoccupied during abatement. Appropriate signage is posted.
2. Vacating spaces adjacent to work area shall be evaluated.
3. Personal protective equipment (PPE) (N95 respirator is recommended according to OSHA respiratory protection standard, utility gloves, eye protection) should be worn by remediation staff.
4. Containment of work area is not necessary. (level I only)
5. Dust suppression methods (high efficiency particulate air filters [HEPA] vacuum, misting and damp mop of surfaces) shall be used.
6. Contaminated materials shall be removed in a sealed plastic bag.
7. HEPA vacuum/mop work area at end of work period.
8. Keep doors to work area closed.
9. Remove trash daily in clean covered containers.
10. HEPA vacuum/mop outside work areas as needed (daily). Provide walk-off mats and change as needed.

**LEVEL II (ALL OF ITEMS 1-13)**

11. Work areas shall be contained. Erect temporary barriers, seal penetrations to prevent dust migration. Plastic sheeting must be fire rated. Openings shall be fixed, closed doors or airlocks. Suggest framed barrier, temporary wall or ceiling clips for jobs > 24 hours. If area cannot be enclosed, consult Safety and Infection Professional.

12. Turn off and/or seal HVAC vents. Use HEPA filtration units exhausted outside. Consult Safety & Infection Professional if outside exhaust not possible. Exhaust must not be on ground level near pedestrians or near air intakes.

13. All areas inside enclosure shall be HEPA vacuumed and cleaned with damp cloth and/or mop with detergent solution and visibly clean before removing barriers.

**LEVEL III (ALL OF ITEMS 1-17)**

14. Recommend personnel specially trained in mold remediation (i.e., industrial hygienists) be consulted.

15. Abatement consultant should specify PPE.

16. Work area enclosure shall be maintained under negative pressure using HEPA filtered units exhausted outside. Consult Safety & Infection Professional if outside exhaust not possible.

17. Respirators must be used in accordance with the respiratory protection standard (29 CFR 1910.135).

**LEVEL IV (ALL OF ITEMS 1-21)**

18. Enclosure shall include anti-chamber/decon room for trash bag/container cleanup (HEPA vacuumed or damp cloth and detergent solution) before removal.

19. Highly sensitive abatement project that may require unoccupied adjacent spaces. Determinations will be made by hospital epidemiologist or designee.

20. Need for special clearance procedures prior to re-occupancy will be determined by hospital epidemiologist or designee.

21. Personnel trained in the handling of hazardous materials and equipped with: full face respirators with HEPA cartridges, disposable protective clothing covering entire body including both head and shoes, and gloves.

Risk Assessment Signatures:

Date: \_\_\_\_\_  
Maintenance/Construction  
Project Manager

Date signed

\_\_\_\_\_  
Infection Professional

Date signed

Location:

Adapted from the New York City Department of Health and Mental Hygiene; OSHA, A Brief Guide to Mold in the Workplace, and Kennedy V, Barnard B, St Luke's Episcopal Hospital, Houston, TX. MMWR Recommendations and Reports Guidelines for Environmental Infection Control in Health-Care Facilities. June 6, 2003 Vol. 52/No. RR-10.