



Mold Prevention and Remediation Program

TABLE OF CONTENTS

INTRODUCTION	3
Objective	3
Applicability	3
Responsibilities	3
Program Enforcement	5
HAZARD ASSESSMENT	6
Visual Inspection	6
Sampling	6
WATER DAMAGE CLEAN UP AND MOLD PREVENTION	7
Prevention Tips	7
Water Damage Cleanup and Mold Prevention ^{2,3,4}	8
REMEDICATION	11
Level 1: Small Isolated Areas (10 sq. ft or less)	11
Level 2: Mid-Sized Isolated Areas (10 – 100 sq. ft.)	13
Level 3: Large Areas (100 + sq. ft.)	14
Level 4: Contamination of the Heating Ventilating and Air Conditioning (HVAC)	16
COMMUNICATION	17
Occupant Communication	17
REFERENCES	18
APPENDIX A	19
Remediation of HVAC Systems	19
A Small Isolated Area of Contamination (<10 square feet) in the HVAC System	19
Areas of Contamination (>10 square feet) in the HVAC System	20

INTRODUCTION

Objective

The objective of the Mold Prevention and Remediation Program is to utilize prevention techniques to minimize the potential for mold and fungal growth, identify, control and remediate areas containing mold and fungal growth, and to protect all university employees. This program shall be used in conjunction with BGSU's Personal Protective Equipment and Hazard Communication Programs.

Applicability

This procedure applies to all university employees who perform water damage restoration and fungal and mold remediation of building components (walls, ventilation systems, support beams, etc.).

Responsibilities

Management (Department Chairs, Directors, Assistant Provosts, Associate Provosts and Vice Presidents) is responsible for

- supporting the written procedures for controlling mold and fungal growth.

Campus Operations or Other Maintenance Personnel are responsible for

- locating the source of the moisture and eliminating the causative agent (i.e. steam line break, roof leak, condensation) and;
- utilizing prevention techniques to minimize the potential for mold and fungal growth.

Immediate Supervisors in Campus Operations, Other Maintenance or Custodial Personnel are responsible for

- reporting any water leaks to Campus Operations for immediate corrective action;
- reporting all visible mold/fungal growth that covers a mid-sized to large isolated area (10 + square feet) to Environmental Health and Safety, before further action is taken;

- reporting all visible mold/fungal growth that would require destructive cleaning procedures to Environmental Health and Safety, regardless of area, before further action is taken;
- reporting all visible mold/fungal growth in a HVAC system to the Environmental Health and Safety, regardless of area, before further action is taken;
- ensuring that employees are aware of the health hazards associated with mold and fungus and providing proper personal protective equipment;
- ensuring employees attend required training sessions on PPE and Hazard Communication and;
- enforcing the use of proper personal protection and taking appropriate disciplinary action in the event an employee does not comply with the requirements of this procedure.

Employees in Campus Operations, Other Maintenance or Custodial Personnel are responsible for

- reporting any water leaks to Campus Operations for immediate corrective action.
- reporting all visible mold/fungal growth that covers a mid-sized to large isolated area (10 + square feet) to their supervisor, before further action is taken;
- reporting all visible mold/fungal growth that would require destructive cleaning procedures to their supervisor, regardless of area, before further action is taken;
- reporting all visible mold/fungal growth in a HVAC system to their supervisor, regardless of area, before further action is taken;
- attending required training sessions on PPE and Hazard Communication and;
- complying with the procedures of this program.

Environmental Health and Safety, Environmental Health and Safety is responsible for

- coordinating the mold remediation procedure;
- performing sampling as needed and;

- consulting with departments to determine whether outside remediation sources are needed, and if so, contractor selection.

Program Enforcement

A violation of a University employee's responsibility must be reported to the employee's immediate supervisor for appropriate action.

HAZARD ASSESSMENT

Visual Inspection

The presence of mold, water damage, or musty odors must be addressed immediately, beginning with a visual inspection. Ventilation systems must be visually checked for damp filters and other damp conditions. Ceiling tiles, walls, cardboard and paper must also be visually inspected for mold growth. When visible mold growth is present, the remediation process must begin.

Sampling

Air sampling methods for some fungi are prone to false negative results and therefore cannot be used to definitely rule out contamination. However, when visible mold growth is not present, but suspected, and/or an individual has been diagnosed with a disease that is, or may be associated with fungal exposure, air monitoring may be necessary. The purpose of this air monitoring is to determine location and extent of contamination. Air monitoring may also be conducted to determine the effectiveness of the remediation by verifying that air concentrations of mold and fungal spores are similar to ambient or outdoor air.¹

If air monitoring is performed, outdoor air samples must also be collected for comparative purposes.

WATER DAMAGE CLEAN UP AND MOLD PREVENTION

Prevention Tips

The key to mold and fungus growth prevention is eliminating the moisture source and cleanup of materials within 24-48 hours. The following tips must be followed to prevent mold and fungal growth.^{2,3}

- Fix leaky plumbing and leaks in the building envelope as soon as possible.
- Watch for condensation and wet spots. Fix source(s) of moisture problem(s) as soon as possible.
- Prevent moisture due to condensation by increasing surface temperature or reducing the moisture level in air (humidity). To increase surface temperature, insulate or increase air circulation. To reduce the moisture level in air, repair leaks, increase ventilation (if outside air is cold and dry), or dehumidify (if outdoor air is warm and humid).
- Keep heating, ventilation, and air conditioning (HVAC) drip pans clean, flowing properly, and unobstructed.
- Vent moisture-generating appliances, such as dryers, to the outside where possible.
- Maintain low indoor humidity, below 60% relative humidity (RH), ideally 30-50%, if possible.
- Perform regular building/HVAC inspections and maintenance as scheduled including replacement of wet filters.
- Clean and dry wet or damp spots within 48 hours.
- Don't let foundations stay wet. Provide drainage and slope the ground away from the foundation.
- Clean with non-phosphate detergents (any phosphate residue is food for mold)
- Do not install vinyl wallpaper on walls. Vinyl wallpaper inhibits drying.

Water Damage Cleanup and Mold Prevention ^{2,3,4}

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"> • Any carpet that has been contaminated over a large area with sewage backup must be discarded and the entire area disinfected with a detergent solution. (see notes below) • Small areas contaminated with sewage backup and areas flooded with water that does not contain sewage backup can be treated as follows. <ul style="list-style-type: none"> ○ Remove all materials from the carpet and remove water with water extraction vacuum. Shampoo the carpet with a dilute surfactant or have the carpet steam cleaned. ○ Reduce ambient humidity levels with dehumidifier and accelerate drying process with fans. ○ Never reuse flooded carpet padding.
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.
Electrical	<ul style="list-style-type: none"> • Consider all wet wiring, light fixtures, electrical outlets to be a shock hazard until it has been checked by an electrician. Until then, turn the power off in the area of the water damage. (Note: only people knowledgeable about electrical shock hazards must shut off the power.) • All electrical circuit breakers, GFIs and fuses that have become wet need replacing. Switches and outlets that were wet can be cleaned and reused but, when in doubt, replace them. • 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 in service, inspect the motors, light fixtures, etc. to ensure no visible moisture/water droplets are apparent.

Table 1 (Cont.): 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
Fiberglass insulation	<ul style="list-style-type: none"> • Discard and replace.
Furniture (Laminate)	<ul style="list-style-type: none"> • If laminate is intact, the furniture must be air dried and cleaned with a detergent solution. • If laminate is not intact, delaminate the furniture and dispose of furniture. The pressed wood under the laminate absorbs water readily and is hard to dry.
Furniture (Particle Board)	<ul style="list-style-type: none"> • Discard unless the furniture has become wet due to a steam line break. The furniture can then be dried and monitored for fungal growth.
Furniture (Upholstered)	<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. • Dispose of furniture if it has been wet due to floods, roof leaks, or sewage back up and ground water infiltration.
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. Turn heat up and use dehumidifiers to dry the area. • 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.
Wallboard (Drywall and gypsum board)	<ul style="list-style-type: none"> • Cut away wallboard and remove all wet and damp insulation immediately, even if the wallboard appears to be dry. • Ventilate the wall cavity, if possible.
Window drapes	<ul style="list-style-type: none"> • Follow laundering or cleaning instructions recommended by the manufacturer.

Table 1 (Cont.): 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
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.) • Test moisture content of studs and sheathing (using a moisture detector) before replacing insulation. Wood must drop below 20% moisture content by weight before you close the wall. • Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry. • Wet paneling must be pried away from wall for drying.
<p>✓ If mold growth has occurred or materials have been wet for more than 48 hours, consult Mold Remediation 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 must 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>	

REMEDIATION

The following sections are guidelines for mold growth remediation. Using the following guidelines, employees will be able to determine whether the situation can be handled by University employees, or whether the Environmental Health and Safety has to be notified for further evaluation.

Level 1: Small Isolated Areas (10 sq. ft or less)

BGSU staff may conduct remediation, using wet methods, under the following conditions:

- mold/fungal growth remediation would **not** require destructive cleaning procedures and/or;
- mold/fungal growth to be remediated is **not** located in a HVAC system.

PPE and Hazard Communication training will cover personal protection and potential health hazards. Custodial staff will also receive training on proper clean up methods. Gloves and goggles are required during remediation. An N95 filtering face piece may also be used on a voluntary basis. The area must be unoccupied during cleaning. Vacating people in the adjacent work area is not necessary.

Mold Remediation in Schools and Commercial Buildings, U.S. EPA. April 2001.²

Table 2: Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water*			
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment
SMALL - Total Surface Area Affected Less Than 10 square feet (ft²)			
Books and papers	3	Minimum N-95 respirator, gloves, and goggles	None required
Carpet and backing	1, 3		
Concrete or cinder block	1, 3		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1, 2, 3		
Non-porous, hard surfaces (plastics, metals)	1, 2, 3		
Upholstered furniture & drapes	1, 3		
Wallboard (drywall and gypsum board)	3		
Wood surfaces	1, 2, 3		

Cleanup Methods

Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.

Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.

Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.

Method 4: Discard _ remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Misting of a detergent solution on the affected area is recommended for dust suppression. The detergent solution must remain on the affected area for five to ten minutes prior to removal. Contaminated materials that cannot be cleaned with a detergent solution must be removed in a sealed plastic bag and thrown out in regular trash. The area must also be mopped with a detergent solution after completion of remediation. All areas must be left dry and visibly free from contamination and debris.⁵

Note: Only employees included in the Respiratory Protection Program will be permitted to perform remediation when destruction of material must occur for mold/fungal growth removal.

Level 2: Mid-Sized Isolated Areas (10 – 100 sq. ft.)

Outside contractors who are trained in the remediation process will perform remediation. Environmental Health and Safety must be consulted prior to remediation. The level of personal protective equipment will be determined on a case-by-case basis. However, respiratory protection must be issued in accordance with OSHA's respiratory protection standard. The area and areas directly adjacent must be unoccupied during cleaning. Further vacating those near the work site is recommended in the presence of people with reduced immune systems, recent surgery patients, infants, people with chronic inflammatory lung diseases or people with respiratory health concerns. Communication between building occupants will be coordinated by Environmental Health and Safety.⁵

Mold Remediation in Schools and Commercial Buildings, U.S. EPA. April 2001²

Table 2: Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water*			
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment
MEDIUM - Total Surface Area Affected Between 10 and 100 (ft²)			
Books and papers	3	Limited or Full Limited: Gloves, N95 respirator of half face respirator with HEPA filter, disposable overalls, goggles/eye protection Full: Gloves, disposable full body clothing, head gear, foot coverings, full face respirator with HEPA filter.	Limited Use polyethylene sheeting ceiling to floor around affected area with a slit entry and covering flap: maintain area under negative pressure with HEPA filtered fan unit. Block supply air vents within containment area.
Carpet and backing	1,3,4		
Concrete or cinder block	1,3		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3		
Non-porous, hard surfaces (plastics, metals)	1,2,3		
Upholstered furniture & drapes	1,3,4		
Wallboard (drywall and gypsum board)	3,4		
Wood surfaces	1,2,3		

Cleanup Methods

Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.

Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.

Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.

Method 4: Discard _ remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Misting of a detergent solution on the affected area is recommended for dust suppression. The detergent solution must remain on the affected area for five to ten minutes prior to removal. Contaminated materials that cannot be cleaned with a detergent solution must be removed in a sealed plastic bag and thrown out in regular trash. The area must also be HEPA vacuumed and mopped with a detergent solution after completion of remediation. All areas must be left dry and visibly free from contamination and debris.⁵

Level 3: Large Areas (100 + sq. ft.)

Outside contractors who are trained in the remediation process will perform remediation. Environmental Health and Safety must be consulted prior to remediation. Full personal protection must be worn including the use of a full-face respirator with a HEPA filter. Respiratory protection must be issued in accordance with OSHA's respiratory protection standard. The area and areas directly adjacent must be unoccupied during cleaning. Further vacating those near the work site is recommended in the presence of people with reduced immune systems, recent surgery patients, infants, people with chronic inflammatory lung diseases or people with respiratory health concerns. Communication between building occupants will be coordinated by the Environmental Health and Safety.⁵

Mold Remediation in Schools and Commercial Buildings, U.S. EPA. April 2001²

Table 2: Guidelines for Remediating Building Materials with Mold Growth Caused by Clean Water*			
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment
LARGE - Total Surface Area Affected Greater Than 100 (ft²) or Potential for Increased Occupant or Remediator Exposure During Remediation Estimated to be Significant			
Books and papers	3	Full: Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter.	Full: Full: Use two layers of fire-resistant polyethylene sheeting with one airlock chamber. Maintain area under negative pressure with HEPA filtered fan exhausted outside of building. Block supply and return air vents within containment area.
Carpet and backing	1,3,4		
Concrete or cinder block	1,3		
Hard surface, porous flooring (linoleum, ceramic tile, vinyl)	1,2,3,4		
Non-porous, hard surfaces (plastics, metals)	1,2,3		
Upholstered furniture & drapes	1,2,4		
Wallboard (drywall and gypsum board)	3,4		
Wood surfaces	1,2,3,4		

Cleanup Methods

Method 1: Wet vacuum (in the case of porous materials, some mold spores/fragments will remain in the material but will not grow if the material is completely dried). Steam cleaning may be an alternative for carpets and some upholstered furniture.

Method 2: Damp-wipe surfaces with plain water or with water and detergent solution (except wood —use wood floor cleaner); scrub as needed.

Method 3: High-efficiency particulate air (HEPA) vacuum after the material has been thoroughly dried. Dispose of the contents of the HEPA vacuum in well-sealed plastic bags.

Method 4: Discard _ remove water-damaged materials and seal in plastic bags while inside of containment, if present. Dispose of as normal waste. HEPA vacuum area after it is dried.

Misting of a detergent solution on the affected area is recommended for dust suppression. The detergent solution must remain on the affected area for five to ten minutes prior to removal. Contaminated materials that cannot be cleaned with a detergent solution must be removed in a sealed plastic bag and thrown out in regular trash. The area must also be HEPA vacuumed and mopped with a detergent solution after completion of remediation. All areas must be left dry and visibly free from contamination and debris.⁵

Level 4: Contamination of the Heating Ventilating and Air Conditioning (HVAC)

Environmental Health and Safety must be contacted before further action is taken. Due to the potential of aerosolization through the building of toxic or allergenic molds and/or fungus, personnel trained in this type of remediation will need to follow the work practice in Appendix A.⁵

COMMUNICATION

Occupant Communication

If a large-scale remediation project is found, the affected employees must be notified. The notification must include a description of the remedial measures and a timetable for completion. Individuals with health problems that appear to be related to bioaerosol exposure must see their physician if a problem exists. Communication with building occupants will be coordinated by the Environmental Health and Safety.

REFERENCES

1. Macher, Sc.D., M/P.H., Editor, *Bioaerosols Assessment and Control*, American Conference of Industrial Hygienists. Cincinnati, Ohio, 1999.
2. *Mold Remediation in Schools and Commercial Buildings*, U.S. EPA. April 2001.
<http://www.epa.gov/iaq/molds/images/moldremediation.pdf>
3. LSU Ag Center Research and Extension. <http://www.lsuagcenter.com>
4. University of Minnesota. <http://www.dehs.umn.edu/iaq/flood.html>
5. *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, New York City Department of Health, Bureau of Environmental and Occupational Disease Epidemiology. April 2000.
<http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml>

APPENDIX A

Remediation of HVAC Systems

Guidelines on Assessment and Remediation of Fungi in Indoor Environments,
New York City Department of Health, Bureau of Environmental and Occupational
Disease Epidemiology³

A Small Isolated Area of Contamination (<10 square feet) in the HVAC System

- a. Remediation can be conducted by regular building maintenance staff. Such persons must receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).
- b. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection must be worn.
- c. The HVAC system must be shut down prior to any remedial activities.
- d. The work area must be covered with a plastic sheet(s) and sealed with tape before remediation, to contain dust/debris.
- e. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.
- f. Growth supporting materials that are contaminated, such as the paper on the insulation of interior lined ducts and filters, must be removed. Other contaminated materials that cannot be cleaned must be removed in sealed plastic bags. There are no special requirements for the disposal of moldy materials.
- g. The work area and areas immediately surrounding the work area must be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.
- h. All areas must be left dry and visibly free from contamination and debris.
- i. A variety of biocides are recommended by HVAC manufacturers for use with HVAC components, such as, cooling coils and condensation pans.

HVAC manufacturers must be consulted for the products they recommend for use in their systems.

Areas of Contamination (>10 square feet) in the HVAC System

A health and safety professional with experience performing microbial investigations must be consulted prior to remediation activities to provide oversight for remediation projects involving more than a small isolated area in an HVAC system. The following procedures are recommended:

- a. Personnel trained in the handling of hazardous materials equipped with:
 - i. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended.
 - ii. Gloves and eye protection
 - iii. Full-face respirators with HEPA cartridges and disposable protective clothing covering both head and shoes must be worn if contamination is greater than 30 square feet.
- b. The HVAC system must be shut down prior to any remedial activities.
- c. Containment of the affected area:
 - i. Complete isolation of work area from the other areas of the HVAC system using plastic sheeting sealed with duct tape.
 - ii. The use of an exhaust fan with a HEPA filter to generate negative pressurization.
 - iii. Airlocks and decontamination room if contamination is greater than 30 square feet.
- d. Growth supporting materials that are contaminated, such as the paper on the insulation of interior lined ducts and filters, must be removed. Other contaminated materials that cannot be cleaned must be removed in sealed plastic bags. When a decontamination chamber is present, the outside of the bags must be cleaned with a damp cloth and a detergent solution or HEPA vacuumed prior to their transport to uncontaminated areas of the building. There are no special requirements for the disposal of moldy materials.

- e. The contained area and decontamination room must be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution prior to the removal of isolation barriers.
- f. All areas must be left dry and visibly free from contamination and debris.
- g. Air monitoring must be conducted prior to re-occupancy with the HVAC system in operation to determine if the area(s) served by the system are fit to reoccupy.
- h. A variety of biocides are recommended by HVAC manufacturers for use with HVAC components, such as, cooling coils and condensation pans. HVAC manufacturers must be consulted for the products they recommend for use in their systems.