

## **Occupational Health and Safety Programs**



## **MOULD PREVENTION, ASSESSMENT AND REMEDICATION**

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## **1.0 INTRODUCTION**

The Mould Prevention, Assessment and Remediation Program was developed in accordance with the University's Policy Statement on Health and Safety and to ensure compliance with the Occupational Health & Safety Act and other relevant regulations.

This procedure has been established to address indoor exposure to mould and to minimize the potential for mould growth and contamination. It outlines the necessary steps that must be followed to safely identify, control and remediate areas where indoor mould is found while protecting the health of building occupants and remediators.

## **2.0 REFERENCES AND GUIDELINES**

- Occupational Health and Safety Act.
- Mould Guidelines for the Canadian Construction Association.
- EPA: Mould Remediation in schools and Commercial Buildings, EPA 402-K-01-001.
- New York City Department of Health, Guidelines on Assessment and Remediation of Fungi in Indoor Environments, NYDOH 2002.
- ACGIH Bioaerosols: Assessment and Control.
- Manitoba Dept. of Labor, Guidelines for the Investigation, Assessment, & Remediation of Mould in Workplaces.
- IAHA, Assessment, Remediation, and Post-Remediation Verification of Mould in Buildings, 3-2004.
- Environmental Abatement Council of Ontario: "Mould Abatement Guidelines", 2004
- Queen's University Mold Procedures.

## **3.0 DEFINITIONS**

HVAC: Refers to heating, ventilation and air conditioning system. In this document contamination of the HVAC system generally refers to mould growth within the air ducts.

Mould: A Group of organisms that belong to the fungi kingdom. Mould in this document refers to mould that has colonized a substrate and formed fungal mycelia & growth structures visible to the naked eye.

Spores: Refers to the reproductive structures in mould. They are small, microscopic particles not visible with the naked eye released by mould to form a new mould colony given the right environmental conditions. Mould spores can travel great distances on skin, clothing, by wind currents and other means.

Level 1 Mould Remediation (small area): Small isolated areas, less than 10 ft<sup>2</sup> (1 m<sup>2</sup>) of building materials or clean-up or less than 10 ft<sup>2</sup> (1 m<sup>2</sup>) of mould growth in HVAC systems in non-occupied areas.

Level 2 Mould Remediation (medium areas): 10 to 100 ft<sup>2</sup> (1 to 10 m<sup>2</sup>) or less than 10 ft<sup>2</sup> (1 m<sup>2</sup>) in HVAC systems in occupied areas.

Level 3 Mould Remediation (large areas): More than 100 ft<sup>2</sup> (10m<sup>2</sup>), or more than 10 ft<sup>2</sup> (1 m<sup>2</sup>) in HVAC systems.

#### **4.0 RESPONSIBILITIES**

##### **4.1 Departments are responsible for:**

- a) Immediately reporting any water leaks or moisture buildup to Facilities Management.
- b) Reporting any visible mould growth to Occupational Health & Safety (OHS).
- c) Contacting OHS if mould growth is suspected either due to the presence of a musty smell or unexplained health symptoms are experienced by building occupants.
- d) Keeping workspaces clean and tidy. Keep spaces dust and debris free. The number of items in a workspace should be kept to a minimum.
- e) Ensuring housekeeping is maintained in storage areas, and items are stored to allow for circulation. Maintain sufficient ventilation and acceptable relative humidity in storage or other unoccupied areas (30 to 50%).
- f) Performing regular inspections of all workspaces.

##### **4.2 Facilities Management are responsible for:**

- a) Ensuring that FM employees and contractors who potentially could encounter mould, or are involved in mould remediation, are knowledgeable about the hazards, and if involved in remediation are trained to perform any necessary remediation outlined in this procedure.
- b) Ensuring that FM employees that are likely to encounter mould or are involved in mould remediation use the appropriate Personal Protective Equipment (PPE). A respirator fit-testing record must be retained on file.
- c) Ensuring that building occupants are notified and kept up to date about the status of the remediation.
- d) Utilizing prevention techniques to eliminate the conditions conducive to mould and fungal growth, including the HVAC system (see Table 4).
- e) Locating sources of moisture and eliminating the causative agent (i.e., pipe break, leaks, condensation, etc.).
- f) Contacting OHS if:
  - ✓ mould /fungal contamination exceeds 10 sq. ft. (Levels 2 and 3), or assistance is required with identification or extent of contamination.
  - ✓ mould/fungal growth is found within the HVAC system, regardless of the extent of mould contamination.
  - ✓ concerns of exposure have been raised.
- g) Conducting Level 1 and 2 remediations.

- h) Assessing Level 3 remediations, with OHS, to determine if remediation can be performed in-house, or requires a contractor. A site-specific SOP will be developed for Level 3 remediations.

**4.3 The Occupational Health and Safety Office is responsible for:**

- a) Reviewing this procedure periodically and communicating it to the appropriate departments.
- b) Investigating instances of suspected mould contamination.
- c) Consulting with FM to determine the Level of mould contamination and remediation required.
- d) Assisting FM in the selection and approval of outside mould remediation contractors.
- e) Arranging for mould sampling and clearance testing as necessary.
- f) Performing follow up inspections for Level 2 and 3 remediations.
- g) Providing training and fit testing to FM employees.

**4.4 Contractors are responsible for:**

- a) Providing confirmation of worker training and competence as outlined in Section 5.0
- b) Following the mould remediation steps specified in this document. A contractor may submit alternative remediation procedures which must be pre-approved by OHS and FM prior to commencing any remedial action.
- c) Ensuring all subcontractors comply with the training and remediation protocols as outlined in this procedure, or with contractor procedures that have been approved by FM/OHS.
- d) Providing confirmation of liability insurance covering mould, and reference to other similar projects to FM/OHS.
- e) Communicating any action to be taken to FM who will notify the building occupants.

**5.0 TRAINING**

Any worker involved in the cleanup and remediation of mould and mould contaminated materials must be knowledgeable about the contents of this program and be trained to safely perform any necessary work required in accordance with this procedure.

**5.1 Training shall cover but is not limited to:**

- a) The mould growth cycle and necessary conditions for sustaining mould growth.
- b) Knowledge of potential health effects resulting from spore inhalation.
- c) The selection and use of appropriate PPE including respirator fit testing.
- d) Isolation of HVAC systems and installation of isolation barriers.
- e) Remediation, cleaning and disposal of mould-contaminated materials including PPE.
- f) Final cleaning of remediation area

## **6.0 MOULD GROWTH PREVENTION AND MOISTURE DAMAGE CLEANUP**

Naturally occurring mould spores can be found in virtually all indoor and outdoor environments. Their presence indoors does not necessarily indicate problems with indoor air. However, mould spores can become a problem when sufficient moisture becomes available for the spores to establish a mould colony. Condensation, leaks, spills and high humidity can all support mould growth if the moisture source is not controlled and eliminated within 24-48 hours. Finding and correcting mould growth in buildings, therefore, becomes an exercise in finding and eliminating areas of moisture collection.

**Cleaning up mould without eliminating the moisture source is not an effective way of controlling mould growth.**

### **6.1 Prevention**

The key to dealing with mould lies in prevention. Mould requires three components to survive, specifically a nutrient source or growth medium, a source of moisture and the proper environmental conditions (e.g., temperature). The best method of mould prevention is to reduce the amount of moisture by keeping the relative humidity between 30% and 50%. Prevention measures include:

- a) Good housekeeping, storage and inspection practices.
- b) Immediate clean-up of any floods or spills (within 24-48 hours). Using dehumidifiers to reduce the relative humidity in the flooded space is recommended.
- c) Keep building and heating, ventilation and air conditioning (HVAC) systems in good repair. Keep drip pans clean, flowing and unobstructed.
- d) Fix leaky plumbing and water leaks as soon as possible.
- e) Vent moisture-generating sources directly to the outside.
- f) Control humidity with air conditioners and/or dehumidifiers. It is important to keep air conditioners and dehumidifiers in good condition. Empty any water collectors regularly so water does not contribute to moisture problems. If using humidifiers, ensure they are cleaned regularly.
- g) Use exhaust fans.
- h) Insulate cold surfaces to prevent condensation on piping, windows, exterior walls, roofs and floors, where possible.
- i) Perform regular maintenance to ensure building envelope, windows and roof do not leak.
- j) Vent moisture generating appliances to the outside.
- k) Reduce the amount of water used when cleaning carpets (as much as possible) and ensure adequate ventilation and humidity control.
- l) Eliminate condensation and wet spots as soon as possible by fixing the source of the problem:
  - Insulate piping.
  - Maintain low indoor humidity, below 60% RH, ideally 30-50% if possible.
  - Provide adequate ventilation in high occupancy areas.

**6.2 Action required for “clean” water damage within 24-48 hours.**

- a) Eliminate and repair source of moisture.
- b) Dry affected area as soon as possible. Refer to **Table 1. Water Damage - Cleanup and Mould Prevention** for cleanup guidelines for specific materials.
- c) Assess surrounding area to ensure sub-floors, wall cavities and other areas remain dry.
- d) Conduct follow up inspections to ensure no visible mould growth has occurred, considering the possibility of hidden mould.

**7.0 MOULD REMEDIATION STEPS**

When visible mould is located, the extent of growth must be fully investigated as mould may be hidden inside walls, under wallpaper, in sub-floors, under carpets and other hard to assess areas. Remediation must take place as soon as possible and only after the source of moisture has been identified and has either been eliminated or will be eliminated upon the initiation of the remediation. The following are recommended steps and guidelines for the removal and cleanup of mould affected areas. It is important to develop a thorough Remediation Plan, especially for larger projects.

**7.1 Pre-cleanup**

- a) FM will determine the Level of Mould Remediation (Level 1, 2 or 3), and determine whether mould remediation will be conducted by FM personnel or an outside contractor. OHS will provide assistance, as necessary.
- b) Consult Table 2. Guidelines for Remediating Building Materials with Mould Growth Caused by Clean Water and/or Table 3. Guidelines for Remediating Mould Growth Caused by Clean Water in the HVAC System to establish a Remediation Plan/SOP that must include the following:
  - ✓ Clean-Up / Remediation method: method may vary depending on the Level of material and the extent of damage caused by mould and moisture,
  - ✓ PPE suitable for the Level of remediation, and
  - ✓ Containment (enclosure) to prevent the release of mould, mould spores and debris into the surrounding building areas.
- c) Notify building occupants of the presence of mould and any remedial action taking place and remove occupants from the immediate area. In some instances (Level 2 and 3 Mould Remediation) susceptible individuals in adjacent areas may need to be relocated for the duration of the remediation.

**7.2 Abatement of Spaces and Cleanup and Removal of Material**

- a) Turn off HVAC systems where possible and seal over any system openings (e.g., diffusers and return air openings) within and immediately adjacent to the work area.
- b) For Level 2 & 3 Mould Removal, clearly visible signs warning of the remediation must identify the area where the removal is being performed. Suggested warning sign:  
**Caution Mould Removal, Authorized Personnel Only, PPE Required.**

- c) Remove mould according to the predetermined Remediation Plan/SOP and guidelines provided. Clean the surrounding area including any airborne particulates.
- d) Cleaning should be done using a mild detergent solution, such as Benefect® Botanical Disinfectant.
- e) Where possible, place a drop sheet below the mouldy materials.
- f) Dust suppression methods should be used where possible, prior to disturbance of the mouldy materials. Tape a section of plastic sheeting or duct tape over the mouldy material, or if this is not feasible, lightly mist the mouldy material with amended water.
- g) Ensure mould spores do not spread to other areas by misting the mould affected area with clean water or a detergent solution prior to any remedial action.
- h) Remove any porous substrate materials (ceiling tiles, drywall, etc.) to a point beyond the immediate areas of visible contamination, for a minimum distance of 30 cm in all directions. Clean the work area and dispose of the waste.
- i) Pre-clean any items that will be retained, whether removed from the work area or covered and left in the work area. Use appropriate cleaning methods.
- j) After bulk removal, clean the surrounding area with a HEPA vacuum. No other type of vacuum can be used. If a HEPA vacuum is not available, wet wiping may be adequate for Level 1 work.
- k) Do not dry sweep or dry whisk. Use power tools only if fitted with effective HEPA-filtered dust collection.
- l) Wipe all non-porous surfaces within the removal area with a detergent solution. Rinse with clear water as required.
- m) Completely seal waste material and contaminated HEPA vacuum bags in two layers of 6ml polypropylene plastic prior to removal from the area. Dispose as regular garbage.
- n) Clean all equipment used in the abatement work area by HEPA vacuuming or wet wiping. Equipment that cannot be readily cleaned shall be HEPA vacuumed and sealed in a 6 mil polyethylene bags before removal from the work area.
- o) Maintain HEPA vacuum as per manufacturer's instructions.
- p) Eating, drinking, chewing or smoking are prohibited in the work area.

### **7.3 Post abatement cleanup**

- a) Remove polyethylene sheeting used during abatement by carefully rolling towards the centre of the work area. Clean any visible dust and debris using a HEPA vacuum.
- b) Clean all tools, supplies and equipment in the work area using a HEPA vacuum and by wet wiping. Equipment that cannot be readily cleaned (e.g., vacuum hose, wire brushes, etc.) shall be HEPA vacuumed and sealed in 6 mil polyethylene bags or suitable sealed containers before removal from the work area.
- c) Seal the intake and exhaust of HEPA filtered exhaust fans (negative air machines) and clean the cabinet by wet wiping, before removal from the work area.
- d) Leave the work area and surrounding areas dry and visibly free of dust and debris.



#### **7.4 Waste disposal**

- a) Remove all waste as contaminated material, including but not limited to building debris, disposable coveralls, respirator filters and/or cartridges, and plastic sheeting.
- b) All waste should be immediately double-bagged into two 6-mil polyethylene bags, each individually sealed. If the material cannot be bagged, wrap in two layers of 6 mil polyethylene sheeting and seal with tape.

#### **7.6 Post-abatement drying**

- a) By the completion of the mould abatement, ensure the cause of the mould growth has been identified and an action plan initiated to prevent further mould growth. This action would include mitigation of the original cause of the mould contamination. This would include such factors as past flooding, moisture intrusion or elevated levels of relative humidity.
- b) At completion of mould abatement check that the remaining finishes (e.g., concrete, wood framing, sub-floors) have been adequately dried so that mould growth will not re-occur when new finishes are installed.
- c) The work area may require further drying efforts before repairs and painting can commence.

#### **7.7 Clearance Inspections and Sampling**

- a) Upon completion of removal and cleaning of contaminated materials and spaces, a competent person shall inspect the work area for acceptable completion, through a combination of careful visual inspections and surface testing.
- b) A site will be considered acceptable and clean when a thorough visual inspection shows that all mould remediation work has been completed and that all surfaces in the work area are free of any visible mould growth, dust, and debris. Surface mould sampling can be completed to confirm the area is clean and free from mould growth.
- c) Ensure that:
  - ✓ Mould contaminated materials have been removed or treated and that adjacent surfaces and hard to reach spots are free of visible mould,
  - ✓ Moisture sources have been effectively eliminated,
  - ✓ Mould growth has not reoccurred, considering the possibility of hidden mould. (Re-inspect every 2-3 weeks until satisfied that the remediation was successful).
- d) Conduct clearance testing as necessary. Refer to section *8.0 Post Remediation Clearance*.
- e) Re-clean any areas or surfaces that do not pass inspection/clearance, i.e., damp wipe with water/detergent, then HEPA vacuum.

The following criteria will be used to assist in determining if re-cleaning of the work area is required.

Clearance Parameter	Result	Required Action
Visual Inspection	Dust free and no visible mould growth.	No further action required, complete surface sampling at discretion.
Visual Inspection	Dust and/or visible mould growth present.	Re-cleaning is required until acceptable condition.
Surface Mould Testing Results	Mould spores present, but no growth or sparse growth indicated.	No further action required, work area passed clearance inspection and sampling.
Surface Mould Testing Results	Sparse to moderate growth Moderate growth Abundant growth	Re-cleaning is required until acceptable condition.

Quantitative testing should be conducted for Level 3 Mould Remediation and remediation of more than 10 sq. ft. of the HVAC system to determine if the area is fit for occupancy.

### 7.8 Communication

Once inspections and sampling are complete, notify occupants about the completion of the remediation.

REVISION SUMMARY		
DATE	REVISION	SUMMARY
10 Dec 23	0	New program

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

<b>Table 1 (Cont.): Clean Water Damage - Cleanup and Mould Prevention</b>	
<b>Guidelines for Response to Clean Water Damage within 24-48 Hours to Prevent Mould Growth*</b>	
<b>Water-Damaged Material†</b>	<b>Actions</b>
<b>Wallboard (Drywall &amp; Gypsum Board)</b>	<ul style="list-style-type: none"> <li>• May be dried in place if there is no obvious swelling and the seams are intact. If not, remove, discard, and replace.</li> <li>• Ventilate and dry the wall cavity, if wet.</li> </ul>
<b>Window drapes</b>	<ul style="list-style-type: none"> <li>• Follow laundering or cleaning instructions recommended by the manufacturer.</li> </ul>
<b>Wood surfaces</b>	<ul style="list-style-type: none"> <li>• Remove moisture immediately and use dehumidifiers, gentle heat, and fans for drying. (Use caution when applying heat to hardwood floors.)</li> <li>• Treated or finished wood surfaces may be cleaned with mild detergent and clean water and allowed to dry.</li> <li>• Wet paneling should be pried away from wall for drying.</li> </ul>
<p>* If mould 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, mould growth may have occurred. Items may be tested by professionals if there is doubt. Note that mould growth will not always occur after 48 hours; this is only a guideline.</p> <p><b>These guidelines are for damage caused by clean water. If you know or suspect that the water source is contaminated with sewage, an experienced remediation professional must be consulted. Do not use fans before determining that the water is clean or sanitary.</b></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>	

Source: Mold Remediation in Schools and Commercial Buildings, U.S. EPA 2001.

<b>Table 2: Guidelines for Remediating Building Materials with Mould Growth Caused by Clean Water* (Wet for more than 48 hours)</b>			
<b>LEVEL 1 - less than 10 ft<sup>2</sup> (1 m<sup>2</sup>) of building materials or clean-up of less than 10 ft<sup>2</sup> (1 m<sup>2</sup>) of mould growth in HVAC systems in non-occupied areas.</b>			
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment
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		

<b>Table 2 (Cont.): Guidelines for Remediating Building Materials with Mould Growth Caused by Clean Water* (Wet for more than 48 hours)</b>			
<b>LEVEL 2 - 10 to 100 ft<sup>2</sup> (1 to 10 m<sup>2</sup>) or less than 10 ft<sup>2</sup> (1 m<sup>2</sup>) in HVAC systems in occupied areas.</b>			
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment
Books and papers	3	Limited or Full Use professional judgment, consider potential for remediator exposure and size of contaminated area	Limited Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated 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		

<b>Table 2 (Cont.): Guidelines for Remediating Building Materials with Mould Growth Caused by Clean Water*</b>			
<b>LEVEL 3 - More than 100 ft<sup>2</sup> (10m<sup>2</sup>), or more than 10 ft<sup>2</sup> (1 m<sup>2</sup>) in HVAC systems.</b>			
Material or Furnishing Affected	Cleanup Methods†	Personal Protective Equipment	Containment
Books and papers	3	Full Use professional judgment, consider potential for remediator/occupant exposure and size of contaminated area	Full Use professional judgment, consider potential for remediator exposure and size of contaminated 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		
<p>*Use professional judgment to determine prudent levels of PPE and containment for each situation, particularly as the remediation site size increases and the potential for exposure and health effects rises. Assess the need for increased PPE if, during the remediation, more extensive contamination is encountered than was expected. Consult Table 1 if materials have been wet for less than 48 hours, and mould growth is not apparent.</p> <p><b><i>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 containment by a professional remediation company is required.</i></b></p> <p>†Select method most appropriate to situation. Since mould gradually destroys the things they grow on, if mould growth is not addressed promptly, some items may be damaged such that cleaning will not restore their original appearance. If mould growth is heavy and items are valuable or important, you may wish to consult a restoration/water damage/remediation expert. Please note that these are guidelines; other cleaning methods may be preferred by some professionals.</p>			

**Table 2 (Cont.): Guidelines for Remediating Building Materials with Mould Growth Caused by Clean Water\***

**Cleanup Methods**

- **Method 1:** Wet vacuum (in the case of porous materials, some mould 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:** Wipe with a mild detergent or 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. Remove material 30 cm past signs of damage or mould. Dispose of as normal waste. HEPA vacuum area after it is dried.

**Personal Protective Equipment (PPE)**

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

**Containment**

- Limited: Use polyethylene sheeting ceiling to floor around affected area with a slit entry and covering flap. Block supply and return air vents within containment area.
- Full: Use two layers of fire-retardant 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.

Please note that Table 1 and Table 2 contain general guidelines. Their purpose is to provide basic information for the remediation managers to first assess the extent of the damage and then to determine whether the remediation should be managed by inhouse personnel or outside professionals. The remediation manager can then use the guidelines to help design a remediation plan or to assess a plan submitted by outside professionals.

Source: Mold Remediation in Schools and Commercial Buildings, U.S. EPA 2001.



<b>Table 3: Guidelines for Remediating Mould Growth Caused by Clean Water* in HVAC systems</b>		
<b>Action Required</b>	<b>&lt;10sq.ft</b>	<b>&gt;10sq.ft</b>
Remove occupants from work area and adjacent areas	Yes	Yes
Seal off work area with 6-mil polyethylene sheeting, sealing all seams	Yes	Yes
Seal off all supply and return air ducts and doors into/out of the contained area.	Yes	Yes
Secure ventilation system	Yes	Yes
Place work area under negative pressure using fan(s) equipped with HEPA filters. Exhaust air outside	Yes	Yes
Use airlocks into/out of the work area	No	Yes
Establish Decontamination room outside of the enclosure	No	Yes
Use dust suppression methods (misting) on any material or object to be removed or cut	Yes	Yes
Dispose of all contaminated material including cleaning materials and vacuum bags in two layers of sealed 6ml polypropylene plastic.	Yes	Yes
Mop or wipe down area after cleaning/removal is complete	Yes	Yes
After damp wiping has dried, clean the same area with a HEPA-filtered vacuum	Yes	Yes
Visually inspect work area for cleanliness (no dust)	Yes	Yes
Conduct clearance sampling before removing containment	No	Possibly

Source: New York City Department of Health - Guidelines on Assessment and Remediation of Fungi in Indoor Environments 2002 and Environmental Abatement Council of Ontario - Mould Abatement Guidelines 2004

<b>Table 4 – Measures for reducing mould growth in HVAC systems</b>			
<b>Component</b>	<b>Design</b>	<b>Maintenance</b>	<b>Administrative</b>
Outdoor air intakes	<ul style="list-style-type: none"> <li>✓ Avoid positioning any intake downwind from significant mould/ moisture sources (e.g., cooling towers, sanitary vents, building exhausts, large bird nesting or roosting sites).</li> </ul>	<ul style="list-style-type: none"> <li>✓ Maintain clean surfaces to prevent accumulation of debris.</li> <li>✓ Maintain access to intakes (e.g., snow and debris removal).</li> <li>✓ Protect intakes and surrounding areas from infestations of birds, bats, rodents or other animals.</li> <li>✓ Promptly remove all standing water, soil, plant, animal or other debris from adjacent areas.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Schedule regular inspections of intakes and surrounding areas to document and maintain proper operation.</li> </ul>
Filters	<ul style="list-style-type: none"> <li>✓ Protect filters from direct wetting by rain, snow, water leaks or flooding to reduce the likelihood of mould growth on the filter.</li> <li>✓ Locate duct humidifiers at least 4.6m (15ft) downstream of the final, high-efficiency filters.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Replace filters according to design specifications or when dirty.</li> <li>✓ Promptly discard wet filters and insulation from HVAC air handling and fan-coil units.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Adhere to filter replacement schedule.</li> <li>✓ Schedule regular inspections of filters between replacement events.</li> </ul>
Condenser units	<ul style="list-style-type: none"> <li>✓ Avoid the use of porous materials on airstream surfaces, particularly in persistently wet areas of HVAC systems.</li> <li>✓ Design cooling coils and spray humidifiers to minimize carry-over of water droplets.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Operate cooling coils and spray humidifiers to minimize carry-over of water droplets.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Schedule regular inspections and cleaning activities to document and maintain proper operation.</li> </ul>

<b>Table 4 (Cont'd) - Measures for reducing mould growth in HVAC systems</b>			
<b>Component</b>	<b>Design</b>	<b>Maintenance</b>	<b>Administrative</b>
Drain pans	<ul style="list-style-type: none"> <li>✓ Slope pans to drain completely. The slope should direct water toward a drainage point, preferably from the bottom of a pan. Do not insulate the pan with porous materials.</li> <li>✓ Isolate the pressure difference between an air-handling unit under negative pressure relative to a mechanical room by installing a water trap in the drain line. The effective height of the water trap should be 40% greater than the expected peak static pressure of the supply air fan (i.e., 1.4 times the peak static pressure).</li> </ul>	<ul style="list-style-type: none"> <li>✓ Keep drain pans clean to avoid extensive mould growth.</li> <li>✓ Physically remove any accumulations that develop, biocide additions without removal of bulk material is insufficient.</li> <li>✓ HVAC components submitted to damp conditions should be cleaned following an approved maintenance schedule</li> </ul>	<ul style="list-style-type: none"> <li>✓ Schedule regular inspections and cleaning activities to document and maintain proper operation.</li> </ul>
Humidifiers	<ul style="list-style-type: none"> <li>✓ Design for “clean steam”, if steam required.</li> <li>✓ Raw steam from a central boiler may be contaminated.</li> <li>✓ Avoid water-spray humidifiers and air washers in non-industrial HVAC systems due to increased maintenance requirements.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Ensure steam sources are cleaned regularly.</li> <li>✓ Ensure surfaces in contact with water/ humidity are cleaned regularly</li> </ul>	<ul style="list-style-type: none"> <li>✓ Discourage the use of console humidifiers or vaporizers in the workplace – adequately cleaning is difficult.</li> <li>✓ Schedule regular inspections and cleaning activities to document and maintain proper operation.</li> </ul>

<b>Table 4 (Cont'd) - Measures for reducing mould growth in HVAC systems</b>			
<b>Component</b>	<b>Design</b>	<b>Maintenance</b>	<b>Administrative</b>
	<ul style="list-style-type: none"> <li>✓ Avoid exposed insulation and air cleaners (e.g., filters) in HVAC plenums or ductwork downstream of humidifiers within the manufacturer-recommended absorption distance.</li> </ul>		
Plenums and ducts	<ul style="list-style-type: none"> <li>✓ Airstream surfaces of HVAC equipment and ductwork should resist accumulation of dirt and debris (or be easily cleanable or replaceable), moisture absorption or retention and biodegradation.</li> <li>✓ Surfaces near moisture-producing equipment should be smooth and non-absorbent.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Maintain all surfaces within the HVAC plenum to prevent the accumulation of moisture or debris.</li> <li>✓ Check for obstructions and proper operation of HVAC system if areas are poorly ventilated</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓ Schedule regular inspections and cleaning activities to document and maintain proper operation.</li> </ul>

Source: Canadian Construction Association – Mould guidelines for the Canadian construction industry 2018