

## 9 MOULDS

More and more firms are involved in removing toxic moulds from contaminated buildings. This section explains

- What moulds are
- Where they are found
- Why they are of concern
- What health effects they may cause
- How they can be identified
- How they can be safely removed.

This section also covers the obligations of employers and others under Ontario's *Occupational Health and Safety Act*.

### Definition

Moulds are microorganisms that produce thousands of tiny particles called spores as part of their reproductive cycle. Mould colonies are usually visible as colourful, woolly growths. They can be virtually any colour—red, blue, brown, green, white, or black. When disturbed by air movement or handling, moulds release their spores into the air. Given the right environmental conditions, these spores can go on to form other mould colonies.

### Locations

Moulds can be found almost anywhere outdoors and indoors. Indoor moulds usually originate from outside sources such as soil and vegetation. Moulds love dark, moist environments and can grow at room temperature on various construction materials including wallpaper, particleboard, ceiling tiles, drywall, and plywood.

Workers can be exposed to toxic spores when working on buildings with some sort of water damage from flooding, plumbing leaks, or leaks in the structure itself.

### Health Effects

In buildings with water damage or ongoing moisture problems, certain types of "water-loving" moulds may reproduce to higher than normal levels and potentially cause adverse health effects. *Stachybotrys chartarum* is of particular concern because it can be found in large colonies and can cause adverse health effects (Figure 9-1).

*Stachybotrys* has gained special attention because it has been discovered in portable classrooms with ongoing moisture problems. It appears as small black patches and grows well on water-soaked cellulose material such as wallpaper, ceiling tiles, drywall, and insulation containing paper.



**Figure 9-1: Staphylococcus Microbes**

In addition to *Stachybotrys*, personnel working in water-damaged buildings may be exposed to other types of toxic moulds such as *Fusarium*, *Aspergillus*, and *Penicillium*.

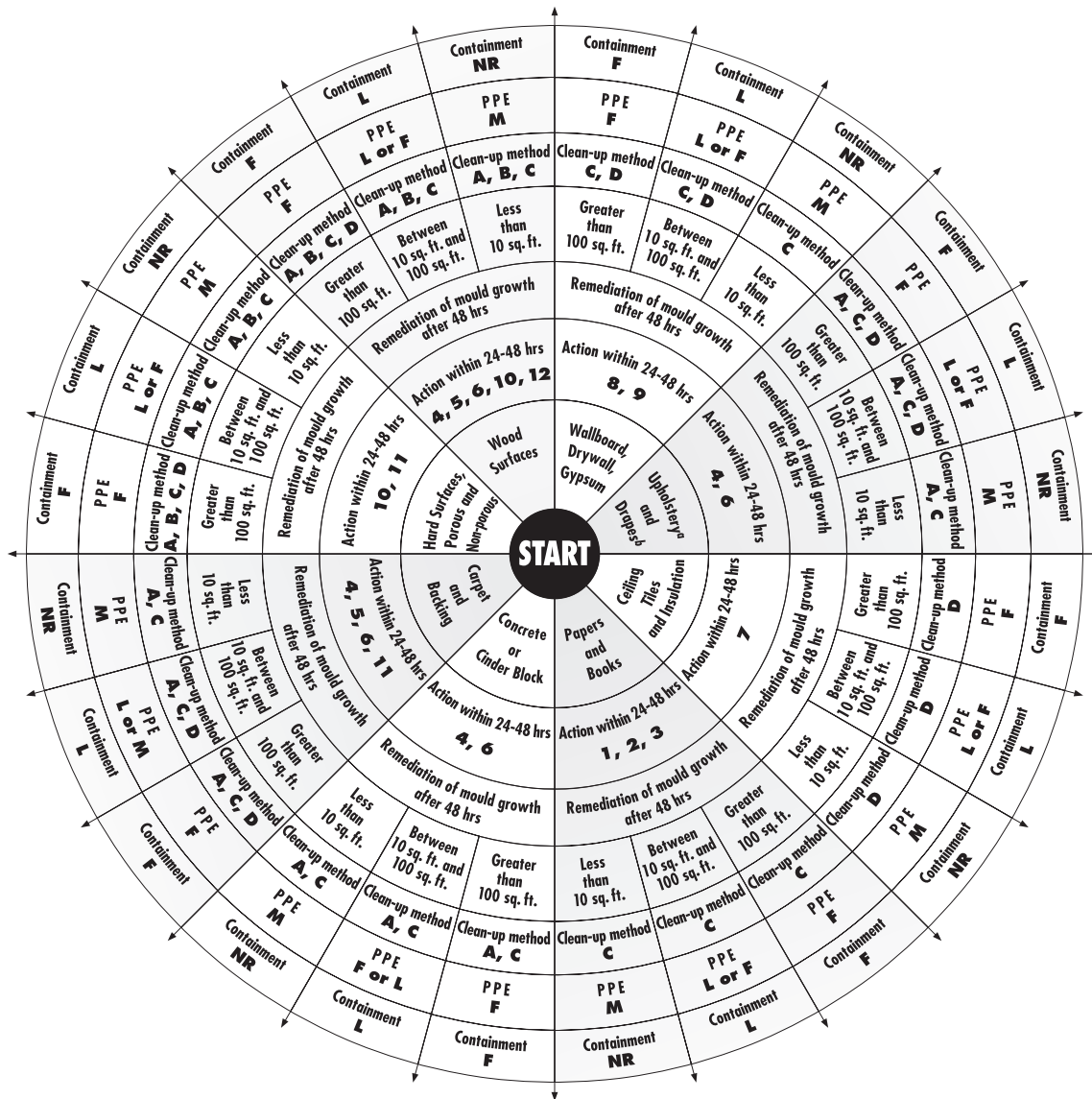
Air movement and the handling of contaminated material can release toxic spores into the atmosphere. These spores cause adverse health effects by producing toxic substances known as mycotoxins. Once released, toxic spores must come into contact with the skin or be inhaled before symptoms can develop.

### Symptoms

The symptoms of exposure to mould are listed below. However, not all exposed workers will develop symptoms.

- Exposure to toxic moulds may irritate skin, eyes, nose, and throat, resulting in allergy-like symptoms such as difficulty in breathing, runny nose, and watery eyes.
- Symptoms such as fatigue and headache have been reported.
- Workers who are allergic to moulds could experience asthmatic attacks.
- Workers exposed to *Stachybotrys* have also experienced burning in the nose, nose bleeds, severe coughing, and impairment of the immune system. *Stachybotrys* does not cause infection and is not spread from person to person.
- People with weakened immune systems are particularly susceptible to mould-related illness and should not work in mould-contaminated areas.

# Mould Remediation Chart



Source: IHSA gratefully acknowledges that this chart is based on *Mold Remediation in Schools and Commercial Buildings*, published by the United States Environmental Protection Agency, March 2001.

## How to Use this Chart

- 1) Start at the centre.
- 2) In the first ring, identify the material you are concerned about.
- 3) In the next ring, find out what actions to take within the first 24-48 hours of CLEAN water damage. Actions are numbered 1, 2, 3, 4 and so on. Each is spelled out under the **Action within 24-48 hrs** section.
- 4) Move to the next ring if mould growth is present and more than 48 hours have passed since water damage. Determine whether the contaminated area is less than 10 sq ft, between 10 and 100 sq ft, or more than 100 sq ft.
- 5) Move to the next ring and follow the clean-up method for the size of the contaminated area. Methods are lettered A, B, C, and D and are described under the **Clean-up Methods** section.
- 6) In the next ring, determine the level of personal protective equipment required. This is indicated by M, L, or F under the **PPE** section.
- 7) In the outermost ring, determine whether containment is necessary and, if so, whether it must be L (limited) or F (full), as explained in the **Containment** section.

## Mould Remediation Chart

The **Mould Remediation Chart** shows how mould growth can be prevented within 24–48 hours of water damage for various kinds of material. It also provides general advice on remediation. However, this information is intended only as a summary of basic procedures and is not intended, nor should it be used, as a detailed guide to mould remediation.

The chart is also available as a poster. Order the *Mould Remediation Chart Poster (P104)* from the **Products** section of the [ihsa.ca](http://ihsa.ca) website.

### Action within 24–48 hrs

Actions are for damage caused by clean water. If you know or suspect that water is contaminated by sewage or chemical or biological pollutants, consult a professional. Do not use fans unless the water is clean or sanitary. If mould has grown or materials have been wet for more than 48 hours, consult the **Clean-up Methods** section.

1. Discard non-valuable items.
2. Photocopy valuable items, then discard.
3. Freeze (in frost-free freezer or meat locker) or freeze-dry.
4. Remove water with water-extraction vacuum.
5. Reduce humidity levels with dehumidifiers.
6. Accelerate drying process with fans and/or heaters. However, don't use heat to dry carpet and use caution when applying heat to hardwood floors.
7. Discard and replace.
8. May be dried in place, if there is no swelling and the seams are intact. If not, then discard and replace.
9. Ventilate wall cavity.
10. For all treated or finished woods, porous (linoleum, ceramic tile, vinyl) and non-porous (metal, plastic) hard surfaces, vacuum or damp-wipe with water or water and mild detergent and allow to dry. Scrub if necessary.
11. For porous flooring and carpets, make sure that subfloor is dry. If necessary clean and dry subfloor material according to chart.
12. Wet paneling should be pried away from walls for drying.

### Clean-up Methods

Methods are for damage caused by clean water. If you know or suspect that water is contaminated by sewage or chemical or biological pollutants, consult a professional. These are guidelines only. Other cleaning methods may be preferred by some professionals.

Consult **Action within 24–48 hrs** in the chart if materials have been wet for less than 48 hours and mould growth is not apparent. If mould growth is not addressed promptly, some items may be damaged beyond repair. If necessary, consult a restoration specialist.

- A. Wet-vacuum the material. (In porous material, some mould spores/fragments will remain but will not grow if material is completely dried.) Steam cleaning may be an alternative for carpets and some upholstered furniture.
- B. Damp-wipe surfaces with water or with water and detergent solution (except wood – use wood floor cleaner. Scrub as needed.
- C. Use a high-efficiency particulate air (HEPA) vacuum once the material has been thoroughly dried. Dispose of HEPA-vacuum contents in well-sealed plastic bags.
- D. Remove water-damaged materials and seal in plastic bags inside containment area, if there is one. Dispose of as normal waste. HEPA-vacuum area once it is dried.

### PPE (Personal Protective Equipment)

Use professional judgment to determine PPE for each situation, particularly as the size of the remediation site and the potential for exposure and health effects increase. Be prepared to raise PPE requirements if contamination is more extensive than expected.

- M** Minimum – Gloves, N-95 respirator, goggles/eye protection.
- L** Limited – Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection.
- F** Full – Gloves, disposable full-body clothing, head gear, foot coverings, full-face respirator with HEPA filter.

### Containment

Use professional judgment to determine containment for each situation, particularly as the size of the remediation site, and the potential for exposure and health effects, increase.

**NR** None Required

- L** Limited – From floor to ceiling, enclose affected area in polyethylene sheeting with slit entry and covering flap. Maintain area under negative pressure with HEPA-filtered fan. Block supply and return air vents in containment area.
- F** 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 in containment area.

## Identification

Owners of buildings that may be contaminated with mould should conduct, at their own expense, an assessment to determine whether or not the buildings are indeed contaminated. The assessment should include building inspection and analysis of bulk samples.

Mould on visible surfaces may be just the tip of the iceberg. Since they thrive in dark, moist environments, moulds may be hidden from view. Thorough inspections of water-damaged areas must be conducted. This involves looking into wall cavities, behind drywall, under carpets, and above ceiling tiles.

Not all moulds are toxic. The type of mould identified and the extent of the contamination will determine the precautions to be taken.

Bulk sampling and laboratory analysis are used to document the type of mould growing on surfaces. The procedure involves scraping surface material into a sealable plastic bag and sending it by overnight delivery to an accredited laboratory.

An accredited laboratory is one that participates in the American Industrial Hygiene Association's Environmental Microbiology Proficiency Analytical Testing Program. The chosen laboratory should have a competent mycologist (a person that studies moulds) who can analyze the sample and determine whether the mould is likely to pose a health risk.

Based on the presence of visible mould, evidence of water damage, and symptoms that are consistent with allergic or toxic response to mould, it may be justified to skip bulk sampling and go straight to remediation (removal).

The person taking bulk samples or performing inspections must be suitably protected for Level 1 work and must be careful not to unduly disturb the mould.

## Removal

Toxic moulds must be removed. However, special control measures must first be implemented to prevent worker exposure and the spread of moulds from the construction area to adjacent areas. This is especially true for *Stachybotrys* because of its potentially severe health effects.

The extent of contamination governs what remediation measures need to be taken in order to prevent the spread of toxic moulds.

Note: The cause of moisture problems should be corrected before any mould remediation takes place.

A follow-up inspection should be conducted three to six months after remediation to ensure that the mould has not returned.

## Employer Obligations

Although there are no Ontario regulations specifically addressing moulds, an employer must, under the OHS Act, take every precaution reasonable in the circumstances for the protection of a worker. Work practices set out by Health Canada in *Fungal Contamination of Public Buildings: A Guide to Recognition and Management* provide a reasonable standard.

Employers have a duty to instruct workers in the safe removal and handling of mould-contaminated material. Workers in turn have the duty to follow these instructions. Building owners must ensure that trade contractors follow proper remediation procedures.