# Mould Management Program

## Background

The growth of mould contamination in buildings is a confirmed health risk for residents. While moulds – a subclass of fungi – occur naturally and pose little harm in the outdoor environment, exposure to elevated levels of mould spores from mould growth in buildings can cause a number of health effects, including:

- Allergic responses such as stuffiness, nasal congestion, sore itchy eyes, sore throat, onset or worsening of asthma.
- Exposure to mould species known to produce mycotoxins (toxigenic species) has been linked to skin rash, eye, nose and throat irritation, cough, nausea, headache, diarrhea, excessive fatigue, and possible suppression of immune function.
- The elderly, children under two years of age and individuals with compromised immune systems may be at risk of serious respiratory effects if exposed to high levels of toxigenic mould species, usually from large areas of contamination.
- Dried deposits of old bird, bat or rodent droppings may be infected with certain pathogenic fungi, can become airborne, and can cause several infectious diseases. Individuals with reduced immune function, including the young, elderly, cancer patients, persons with HIV, etc., are at greater risk of infection and the consequences may be more severe for them.

## Responding to Concerns over Mould Contamination

**When to Investigate**

Investigate for mould contamination whenever you:

- Become aware of reports of adverse health effects that might be related to mould.
- Become aware of current or past water damage.
- Identify mould-suspect staining or water damage during normal inspections.

Have the Building Manager or designate complete and inspect a *Mould Notification Order*, found on page 70. The investigation will include at least the following three steps:

***1. Review Staff and Resident Concerns and Obtain Input***

When staff or residents report either health concerns or actual conditions, this information must be acted on promptly. Obtain staff input during internal assessments to identify problem locations. The internal assessment will include the possibility of transferring some residents.

***2. Review Building History***

Review the building history with the maintenance manager to discuss any history of water leaks, repairs, roofing projects, floods, maintenance issues with plumbing, and other precursors to mould growth.

***3. Inspections***

Consider all areas of potential mould growth during your inspections. Areas more commonly found to contain mould growth include:

- Bathrooms.
- Around windows and doors.
- Closets.
- Cold sections of wall or floor assemblies.
- Cooling coil sections of air handling units and associated ductwork, especially where the equipment is internally lined with porous insulation.
- Foundation walls.
- Crawlspaces and tunnels.

Be alert to obvious signs of mould growth, such as black, gray, green or white growth, and also to musty or dank odours and areas of high humidity.

During the inspections, use the following equipment:

- Humidity sensor.
- Moisture meter.

# Preventative Measures

Mould growth is dependent on three factors:

- Suitable temperature (5-30° C),
- Suitable nutrients (cellulose-containing materials such as wood, drywall, or carpets, organic debris, dust and other materials), and
- Adequate moisture (a minimum humidity of 70 per cent).

Mould prevention includes eliminating mould-prone materials during construction or renovation, and moisture control through ventilation, occupant practices, and maintenance.

**Advice to Residents on Preventing Mould Growth**

You can encourage residents to reduce the likelihood and severity of mould contamination by taking a number of practical steps in their units. Circulate an information sheet with the following recommendations to control mould growth:

- After showering, operate exhaust fans for a prolonged period or open the window.
- When cooking, use lids on pots where possible to limit moisture loss.
- Do not operate humidifiers unless recommended by a medical professional.
- Try to maintain relative humidity levels of less than 60 per cent in winter months. Avoid circumstances where excessive moisture condenses on windows.
- Promptly report any mould-suspect staining, water leaks (plumbing, around windows, roof leaks, etc.), or musty odours.

**Maintenance Practices for Mould Prevention**

- Maintain bathroom exhaust systems in clean and functioning condition.
- Remove mould growing on windows in bedrooms as soon as reported.
- Maintain caulking in bathrooms, showers and at exterior locations.
- Avoid carpets on cool floors to prevent condensation, for example, on balconies.
- Use the highest grade of filters to reduce the amount of incoming spores.
- Maintain bird screens at air intakes and keep roosting birds from air intake areas.
- Respond to plumbing problems as quickly as possible.
- Ensure that exterior landscaping drains water away from foundations, and that eavestroughs and downspouts are kept clear.

**Preventing Mould Growth During Renovation**

When performing significant renovations, consider steps that could reduce the chances of mould developing, including:

- Improving ventilation in bathrooms and bedrooms. (Whole house ventilation systems.)
- Improving details of water runoff around foundations.
- Improving foundation drainage.
- Selecting moisture/mildew-resistant paints for mould-prone areas such as kitchens, bathrooms, laundry areas, etc.
- Selecting mould-resistant products for bathrooms and exterior sheathing applications.
- Selecting window systems to minimize condensation and materials that will not support mould growth.
- Avoiding finishes that will trap moisture on the inside of foundation walls.

**Abatement Procedures and Management**

There are three levels of abatement work, and the general principles for each level are listed below. If you have provided suitable training, your staff may perform Level 1 and Level 2 work. An environmental consultant should direct Level 3 work, which will require skilled, specialized contractors.

It is imperative that water incursions be corrected before commencing mould abatement, or else mould growth will continue after you have completed the abatement work.

Surface mould growth on windows and in bathrooms does not usually involve toxigenic species. Residents can be advised to clean such contamination with household cleaner and water, if it's limited to surface spotting. Residents should not clean any more extensive growth, especially where the growth involves crumbly surfaces or where moisture appears to be coming through the surface.

Complete the *Mould Notification Order* when notified of a mould problem. Based on the level of mould growth, your Building Manager can instruct the resident or staff to clean it or refer it to an environmental consultant. If the resident or staff clean the mould, set up a follow-up inspection within three months to make sure the mould has not returned, as outlined in the *Mould Notification Order*.

**Equipment and Materials for Level 1 and Level 2 Work**

- HEPA Vacuum Cleaner: Vacuum cleaner fitted with HEPA filter (99.97 per cent efficient at 0.3 micrometers), with appropriate tools.
- Decontamination solution: Detergent in water (liquid dishwasher detergent, one capful per gallon).
- Polyethylene: 10-mil nominal thickness polyethylene sheeting secured and sealed with duct tape or other suitable means.
- Coveralls: Disposable coveralls made of Dupont Tyvek, Kimberley Clarke or approved equal, with elasticized cuffs and hood. Tape in place at ankles and wrists.
- Disposal bags: Minimum (0.15 mm) 6-mil thickness polyethylene. Seal prior to leaving contaminated area.
- Other tools as necessary for work and demolition: Humidity sensor, moisture meter, knives, wrecking bar, pliers, hammer, wash buckets, etc.
- Respirator: Half face, air-purifying respirator fitted with a P100 filter cartridge for Level I and 2. A powered air purifying respirator with high efficiency filters, combination acid gas and P100 protection is required for Level 3 work.

**Level 1 Principles: Small Isolated Areas**

Level 1 applies to no more than two square feet of contiguous mouldy area, for example, stained ceiling tiles or minor mould growth at a sink. The principles for Level 1 are:

1. Workers shall be trained in hazards of mould abatement and in the procedures to be followed.
2. Workers shall wear latex or nitrile gloves and a half face-piece air-purifying respirator fitted with a P100 filter cartridge.
3. Where possible, a drop sheet will be placed below the mouldy material, if removing the mouldy material is likely to generate dust.
4. If the contamination has not penetrated the surface, surface decontamination will proceed as follows:
   - HEPA vacuum to remove surface debris and mould spores.
   - Clean wood or hard surfaces with visible mould growth with decontamination solution.
   - Wipe all contaminated surfaces with the detergent solution. Detergent solution should be applied by wiping on with a sponge or cloth.
   - Rinse decontaminated surfaces using clean water and wiping with sponge, squeegee or other means, and wring into a separate container. Rinse water must be replaced frequently. Do not put a dirty sponge, squeegee or cloth back into the clean rinse water. When properly wiped, the surfaces shall be sufficiently dry so no surface residue exists.
   - Any contaminated material will be taken out in sealed plastic bags.
5. If contamination has penetrated the surface, follow these procedures:
   - If possible, a section of plastic sheeting will be taped over the mouldy material, or duct tape itself will be placed over the mouldy area, to contain the dust during removal.
   - Any porous substrate material will be removed well beyond the immediate areas of visible contamination, for a suggested minimum of 30 cm in all directions.
   - The contaminated material will be taken out in sealed plastic bags.
6. The worker will wash face and hands after work. Clean the respirator and ensure it is dry before putting into storage. Dispose of the respirator filters after each use, as mould contamination can grow into the filter material.

**Level 2 Principles: Larger Isolated Area**

Level 2 principles apply to a larger area of 2-30 square feet, for example, one drywall panel. Level 2 principles are:

1. Workers shall be trained in the hazards of mould abatement and in the procedures to be followed. The worker could be a maintenance worker in the building.
2. The worker shall wear latex or nitrile gloves and a half face-piece air-purifying respirator fitted with a P100 filter, plus chlorine, if conditions require. In addition, the worker should wear impervious coveralls.
3. The area will be isolated with a mini-enclosure, constructed of 10 mil polyethylene sheeting, tape and supports as required. Negative pressure will be provided to the mini-enclosure, through use of a HEPA vacuum located outside the enclosure.
4. If possible, a section of plastic sheeting will be taped over the mouldy material, or duct tape itself will be placed over the mouldy area, to contain the dust during removal.
5. The project manager will have to decide how much porous substrate material to remove beyond the immediate area of visible contamination, on a case-by-case basis.
6. Contaminated material will be taken out in sealed plastic bags.
7. After removal, surrounding areas will be cleaned with a HEPA vacuum. (No other type of vacuum should be used.) Follow by wiping with a liquid dishwasher detergent solution, rinsing with clean water and wiping dry. Ensure that surfaces are effectively dried before reconstructing the area. (Refer to procedure number four in Level 1.)
8. The worker will wash face and hands after work. Clean the respirator and ensure it is dry before putting into storage. Dispose of the respirator filters after each use, as mould contamination can grow into the filter material.

**Level 3 Principles: Large Scale Remediation or Remediation of HVAC Systems**

Level 3 principles apply to an area more than 30 square feet or HVAC systems. Level 3 principles are:

1. Workers shall be trained in the hazards of mould abatement and in the procedures to be followed. Only workers experienced in hazardous materials abatement should perform Level 3 work.
2. The worker shall wear nitrile gloves under work gloves and Powered Air Purifying Respirator with high efficiency filters. Dispose of filters daily due to potential for mould growth. A respirator with a combination acid gas and P100 protection may be required during application of disinfectant solution and full strength bleach. Full body impervious coveralls are required. Poly-coated coveralls may be needed for use of full-strength bleach, if used.

3. Site isolation:
   - Full slab-to-slab isolation.
   - Negative pressure units with HEPA filtration, leak tested on site.
   - Ductwork severed and sealed.
4. Provide a dry worker decontamination facility consisting of a clean change room and a dirty change room.
5. Provide a two-chamber waste handling facility for projects generating larger quantities of waste.
6. Remove articles to be retained:
   - Visibly mouldy articles cannot be retained and must be disposed of.
   - Hard surfaced materials with possible spore contamination but no visible mould growth can be cleaned with HEPA vacuum and wet wiping, followed by drying, and retained.
   - Soft materials with possible spore contamination but no visible mould growth will be cleaned by commercial laundering or dry cleaning.
7. Dispose of porous contaminated materials with visible mould contamination:
   - Drywall.
   - Mineral wool insulation.
   - Carpeting.
   - Soft furniture.
   - Ceiling tiles, etc.
8. Perform any required demolition.
9. Carefully HEPA vacuum the site.
10. Perform final cleaning:
    - Clean concrete surfaces with trisodium phosphate, made at 250 ml in 10 litres. Wash and scrub well, then rinse with clear water. Keep rinse water clean. Wipe dry.
    - Clean wood or hard surfaces with visible mould growth with decontamination solution, rinse with clean water and wipe dry. Ensure surfaces are effectively dried before reconstructing the area. (Refer to procedure number four in Level 1.)
11. Moisture control is critical at the end of the project to prevent future mould growth. Measure the surface moisture on all susceptible surfaces and do not rebuild until surface moisture is reliably reduced to less than 60 per cent.