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1 Purpose

This program outlines the procedures associated with the investigation, identification and remediation of mould in University of Manitoba facilities.

2 Scope

This program applies to all employees, students and facilities at the University of Manitoba.

3 Definitions

EHSO	Environmental Health and Safety Office
Mould	Refers to various species of fungi. Mould often grows best in humid or damp conditions and may contribute to poor indoor air quality.
Indoor air quality (IAQ)	The air quality within buildings and structures, especially as it relates to the health and comfort of building occupants.
Remediation	In the context of mould, refers to the removal and cleaning of building materials contaminated by mould. This can include sanitizing, demolition, treatment or replacement of building materials.
Moisture Intrusion	Refers to the unwanted penetration of water into a building in amounts that can cause damage to building materials or growth of mould. Intrusion can come from things like, plumbing issues, building envelope leaks, seepage, flooding, or high humidity.

4 Responsibilities

It is the responsibility of the **Employee** (or any UM Community member) to:

- Report any identified moisture intrusion or possible mould to their supervisor.

It is the responsibility of the **Supervisor** to:

- Contact Physical Plant Customer Service desk to report any moisture intrusion, such as plumbing leaks, immediately to avoid the risk of mould growth.
- Contact Physical Plant H&S to assess any identified potential mould.

It is the responsibility of **Physical Plant Health and Safety or EHSO** to:

- Investigate and provide support when needed in the identification of possible mould.
- Provide guidance required to assist in mould remediation.
- Monitor the efficacy of this program and update as necessary.

It is the responsibility of **Physical Plant** to:

- Investigate and repair any sources of moisture intrusion.
- Remove moisture from areas where it has accumulated in order to prevent mould growth.
- Remediate materials and infrastructure affected by mould growth

5 Mould and Occupational Health

Mould is present in both indoor and outdoor air at varying levels throughout the year. Exposures to these levels do not generally present a health hazard to most individuals. The risk increases in a contaminated situation such as where moisture intrusion is occurring over time and mould is given the opportunity to grow.

Adverse health effects can vary depending on the individual, their personal susceptibility or health, level of exposure, and species of mould. Some health effects include: allergic reactions, asthma attacks, congestion, eye nose and throat irritation, and other flu-like symptoms.

6 Mould Identification and Growth Conditions

Moulds are a common type of naturally occurring fungi found indoors and outdoors. Exposure to airborne mould occurs on a daily basis and not all moulds are harmful. There will always be a baseline level of mould present indoors. Excessive amounts of mould may contribute to poor air quality and can cause health problems.

Moulds grow as thread like masses and growth can often be seen as discoloration on surfaces ranging from white to orange to green to brown or black. Mould reproduces and spreads by releasing spores and grows best in dark, humid habitats where organic matter (nutrient) is available. In a building, humid and damp conditions may occur due to moisture intrusion such as a plumbing leak or building envelope leak. This can allow building materials like wood, drywall, ceiling tiles or cloth to become damp for an extended period of time allowing the opportunity for mould to grow.

6.1 Visual Identification

Mould can have some variance in appearance. Some common types of mould are described in Table 1.

Table 1. Description of Common Moulds

Cladosporium/Alternaria	Most common airborne outdoor moulds. Generally thrives on dead leaves and other rotting plant matter. Produces high amounts of spores, particularly during late summer and fall. High levels can also be found indoors in areas with poor ventilation and humid conditions as well as at times when outdoor concentrations are high.
Aspergillus/Penicillium	Can be found indoors and outdoors. They are commonly associated with indoor moisture intrusion and can cause allergic reactions or sensitivities in some individuals.
Stachybotrys	A dark coloured fungus that thrives on water damaged cellulose rich materials such as sheet rock, paper and ceiling tiles. This mould can produce mycotoxins and exposure can cause symptoms such as coughing, cold and flu like symptoms, headache and dermatitis.
Chaetomium	A mould commonly found in water damaged areas and is similar in appearance to Stachybotrys mould. It is often found in damp wallpaper, drywall, cardboard, and books. This mould also produces high levels of mycotoxins which can cause symptoms such as coughing, cold and flu like symptoms, headache, and dermatitis.

Figures 1, 2 and 3 show mould growing in different scales on building surfaces.



Figure 1. Small mould area less than 1 m²



Figure 2. Medium mould area, more than 3 patches or an area greater than 1 m² but less than 3 m²



Figure 3. Large mould area, a single patch is larger than 3 m²

Source of images in above figures: <https://www.canada.ca/en/health-canada/services/publications/healthy-living/addressing-moisture-mould-your-home.html>

7 Identifying Moisture Intrusion

It is important to ensure any signs of moisture intrusion or leaks are reported as soon as possible. If the source of moisture is eliminated and any remaining moisture is dried, the growth of mould can be prevented.

Some signs of moisture intrusion include:

- Discolouration on ceiling tiles or walls.
- Bubbling or sagging paint.
- Visible accumulation of water
- Musty or damp odours

If any of these signs are observed, they should be reported to the Physical Plant Customer Service Desk as soon as possible.

Some examples of signs of moisture intrusion are shown in figures 4, 5 and 6.



Figure 4. Staining and discolouration on ceiling tiles



Figure 5. Peeling, sagging or bubbling paint on surfaces.



Figure 6. Staining and residue from water accumulation or condensation.

7.1 Moisture Response

If moisture is found Physical Plant will begin by investigating the source of moisture. This may arise from a variety of sources such as plumbing leaks, flooding due to weather, damaged building envelope, condensation, or occupant activities. The source of moisture may also affect the extent of remediation. Moisture that may be contaminated from chemical storage, or occupant activities as well as moisture from sewer back up will require additional remediation compared to rainwater or water supply plumbing leaks.

Moisture intrusion may be discovered in a variety of ways. It may be found by employees during normal working hours in offices or laboratories, PP employees working in mechanical spaces, or UMSS ISOs while on patrol. Moisture intrusion can also occur at any time during or after normal working hours. For moisture discovered during work hours, staff should contact the Physical Plant Customer Service Desk immediately. PP H&S will respond to assess the situation and initiate next steps based on this assessment.

After Hours Response

When moisture intrusion is found after normal working hours, staff should contact 204-474-6281 to reach the Central Energy Plant. An assessment will be conducted by PP staff. For a large intrusion where external contractors are required, PP staff and/or UMSS will contact the Administrator on Call (AOC) to coordinate the response. If class or other work processes will be impacted, the Emergency Response Manager (ERM) will also be contacted to notify impacted individuals or departments.

For smaller intrusions that can be handled internally, the AOC will coordinate the response with the appropriate Physical Plant shops to correct or repair the source of moisture and the caretaking staff to remove water and place fans to begin the drying process. Temporary measures may be put in place until regular working hours or appropriate PP staff may be called in over weekends or holidays to start remediation.

7.2 Investigation of Moisture Intrusion

When moisture intrusion occurs, it is imperative that the affected materials are dried out or removed as soon possible in order to prevent the growth of mould. PP H&S will conduct an investigation of the intrusion and coordinate with the appropriate PP staff to correct or repair the source of moisture. After the source of moisture intrusion has been corrected, investigation tools such as a moisture meter and thermal imaging camera can be used to identify areas affected by moisture.

An event such as a small amount of leakage from heavy rain may be possible to dry using dehumidifiers and fans. Larger scale moisture events such as a sprinkler head activation or major plumbing leaks may need additional resources such as an external contractor to be brought in to investigate and replace moisture affected building materials faster in order to prevent mould growth. The investigation of moisture is crucial to ensure that the complete extent and all areas that have been affected by are identified so everything can be dried. If areas of moisture are not found, mould may begin to grow. If mould is identified during this investigation, next steps will proceed as per section 8.1.

Porous materials such as drywall, ceiling tiles or carpet must be dried within 48 hours of becoming wet to prevent mould growth. Porous materials that have been wet for an indeterminate period will likely need to be discarded. Wall material should be removed to a point that it is no longer wet.

If an area is being dried with fans and dehumidifiers, it should be checked every 24 hours to ensure that the drying is effective and that no mould begins to grow.

8 Reporting Mould and its Investigation

The potential for mould can be identified at any time from any UM Community member (staff, faculty, students, contractors or visitors). Suspected mould contamination should be reported to EHSO@umanitoba.ca.

Mould contamination in a building may also occur as a result of a more chronic issue with slow undetected moisture intrusion or high relative humidity resulting in condensation on surfaces rather than an acute significant moisture intrusion event.

This may be identifiable from:

- musty or mouldy odours,
- humid environments,
- discolouration on surfaces,
- occupants experiencing allergic reactions or respiratory issues

8.1 Investigation of Suspected Mould

Similar to a moisture intrusion event, tools such as thermal cameras and moisture meters can be used to investigate the possible presence of mould. When occupants report experiencing symptoms possibly related to mould, musty odours or visible mould growth, an investigation should be conducted. This investigation should include a visual inspection looking for evidence of moisture or mould growth such as staining on walls and ceiling tiles, peeling paint, or condensation

on windowsills. Occupants of the area should also be interviewed regarding symptoms or health effects as well as the history of the area which may include knowledge of previous incidents of moisture intrusion.

Mould will require an organic substrate on which to grow, such as, drywall, ceiling tiles, fabric, or wood. Mould generally does not grow on surfaces like glass or metal. Dirt and grime can sometimes look similar to and be mistaken for mould. Suspected mould on non-porous surfaces can be washed with soap and water. Bleach is not recommended to remove suspected mould.

8.2 Sampling

Investigation with the thermal camera and moisture meter may show areas of elevated moisture or cooler temperatures which can indicate moisture or condensation behind walls or surfaces. If visible mould is observed, sampling is generally not necessary, as the contamination should be removed.

If there is uncertainty whether what is identified is in fact mould, surface sampling can be conducted, however it is not recommended. Note that [Health Canada](#), “in accord with other public health organizations, does not recommend testing the air for mould. An air test does not provide information on health and does not address the cause of mould damage in the building. You also do not need to know the type of mould present in order to remove it”.

If a material appears to be contaminated with mould, it should be cleaned or removed regardless of whether the contamination is mould. Sampling may be conducted by qualified professional external consultants as part of the remediation process.

Health Canada’s bulletin Mould in Indoor Air – Environmental and Workplace Health, 2012, does not have any numerical exposure limits for mould. Health Canada states that “since people have different sensitivities, it is not possible to establish a safe limit for mould.” In addition Health Canada “recommends removing any mould found growing indoors and fixing the underlying moisture problem.”

9 Remediation

If the presence of mould is confirmed, remediation is required. The first step is ensuring the source of moisture intrusion that caused the mould contamination is eliminated. Proper repair of any moisture intrusion is essential to prevent growth or re-growth of mould in the area. Then the contaminated porous materials can be removed and non-porous materials cleaned. This may require the use of a qualified mould remediation contractor. Any area of moisture intrusion or mould will be assessed by Physical Plant Health and Safety to identify whether a qualified contractor is needed. Generally, areas of mould contamination greater than 1 m² will require qualified external consultants for remediation.

9.1 Steps and requirements for remediation

The area must be dried out as soon as possible to prevent further growth of mould. Thorough clean up, drying or removal of water damaged materials will prevent or limit growth of mould. Porous materials that have become wet for an indeterminate amount of time are usually discarded. Porous

materials can include things like furniture, gypsum wallboard, insulation, and carpet. Generally porous materials can only be considered for drying if they can be dried within 48 hours of becoming wet. Soap and water are recommended for cleaning non-porous materials.

Procedures for removing mould will vary depending on the size of the contaminated area: small, medium or large.

Small area: less than 1 m²

Medium area: between 1 m² and 3 m²

Large area: greater than 3 m²

Applicable to all areas of mould removal – small, medium and large:

The work area should be unoccupied. Eating, drinking, chewing and smoking are prohibited in the work area.

Respiratory protection, the selection of which is dependent on the extent of the contaminated area, gloves and eye protection (goggles are preferred) are required. All respiratory protection must be properly fitted according to the current CSA Standard: Selection, use and care of respirators Z94.4-11, by personnel trained and competent in the task of respirator fit testing. Compressed air must not be used to clean up or remove contamination from any contaminated surface.

Prior to removal, all surfaces of material to be removed must be gently misted (not soaked) with a suitable solution, soap or detergent and water, to minimize the spread of mould or spores prior to removal. The spread of contaminated debris from the work area must be controlled by placing 6-mil polyethylene plastic sheeting under the contaminated material to be removed. To avoid cross-contamination with adjacent unaffected areas, all contaminated debris must be bagged in 6-mil polyethylene plastic bags or wrapped in the sheeting. The bags and sheeting must be sealed immediately and removed from the area for disposal as soon as possible.

Sharp items capable of puncturing the polyethylene material should be packaged in such a way as to prevent them from puncturing the material before being bagged or wrapped. Any plastic sheeting used in the process must be disposed of with the contaminated debris upon completion of the removal.

The sealed polyethylene bags should be removed from the building as soon as possible. The bags may be disposed of in a licensed landfill. There are no special requirements for the disposal of mouldy material. The worker transporting the sealed bags to the exterior of the building must be informed of the content and be trained on the procedures to follow in the event of puncture (e.g., donning personal protective equipment (PPE), securing the area and clean-up).

An assessment of risk is to be conducted for any controlled product used in the removal process. An associated SAFE work procedure must be developed to include, but not be limited to, outlining the appropriate PPE for its usage and handling.

Washing facilities for hands and face must be made available to workers in the work area and workers must wash before leaving the work area.

9.1.1 Small area – less than 1 m² of mould

Small area procedures can be considered when fewer than three patches of mould are present in the same room, provided the sum total of all mould present does not exceed 1 m².

All workers performing the removal of materials contaminated by mould must be provided with a minimum of N95 respiratory protection or a half-mask with P100 filters, gloves and eye protection. Appropriate respiratory protection must also be evaluated for any wetting agents that are to be used during the remediation. All mechanical ventilation (HVAC and duct openings) in the immediate area must be disabled and sealed to prevent any contamination (e.g., mould spores) from entering the ventilation system. Electrical circuits in proximity of the contaminated area(s) must be deactivated unless equipped with ground-fault circuit interrupters.

9.1.2 Medium area – between 1 m² and 3 m² of mould

Medium area procedures can be considered when there are one or more isolated patches larger than 1 m² in the same room, provided the sum total of all mould present does not exceed 3 m².

Clearly visible signs warning of the remediation must identify the area where the removal is being performed. Where a removal is conducted and where walls do not already enclose the contaminated area, the spread of contamination from the area must be prevented by the construction of a small walk-in negative pressure enclosure. Movement of personnel and removal of waste to and from the contaminated area shall be controlled via the construction of an attached, single-stage airlock. The negative pressure enclosure and the attached airlock must be constructed of, at minimum, one layer of 6-mil polyethylene or other suitable material, with reinforced polyethylene on the floor.

The negative pressure enclosure must be kept at a minimum pressure differential of at least -5 Pa (-0.02 inches of water gauge) relative to the air outside of the enclosure at all times during the operation by an exhaust ventilation unit equipped with a HEPA filter and vented to the outside of the building.

All mechanical ventilation in the contaminated area, except that required to maintain the negative pressure, must be disabled and blocked to prevent any contamination (e.g., mould spores) from entering the ventilation system.

At least one layer of 6-mil polyethylene must be placed over all openings in the contaminated area including the ventilation system components in the area. Electrical circuits inside the contaminated area must be deactivated unless equipped with ground-fault circuit interrupters.

Only persons wearing protective clothing, eye protection, gloves, a minimum of a re-usable half-mask with P100 filters for respiratory protection and any appropriate protection for wetting agents, as determined by the assessment of risk, are allowed to enter the contaminated area. All contaminated debris must be cleaned up frequently and immediately upon completion of the work. All contaminated debris must be bagged in 6-mil polyethylene bags.

The outside surface of all polyethylene bags must be either vacuumed with a vacuum equipped with a HEPA filter, or wet wiped with an appropriate solution of soap or detergent and water before being removed from the area or negative pressure enclosure for disposal. Alternatively, the initial

bag of waste can be placed in a second (clean) bag, by a second worker located inside the adjoining airlock/waste transfer chamber, prior to the work being removed from the work area. The choice of procedure will depend on the building occupancy at the time of remediation and the risk of exposure to occupants and contamination to surroundings areas in the event that a bag should break open while exiting the building. Many contractors will prefer the two-bag method for efficiency over wet wiping.

All surfaces inside the negative pressure enclosure must be either vacuumed with a vacuum equipped with a HEPA filter or wet wiped with an appropriate solution of soap or detergent and water prior to dismantling the enclosure.

All polyethylene sheeting used to receive contaminated materials, to form the negative pressure enclosure and to cover all openings inside the contaminated area, must be folded to contain any remaining debris and bagged in 6-mil polyethylene bags, sealed and disposed of or properly decontaminated prior to reuse.

All persons must decontaminate their protective clothing, eye protection, gloves and respirators by using a vacuum cleaner equipped with a HEPA filter, or by wet wiping with an appropriate solution of soap and water after completing the work and before leaving the contaminated area. Contaminated protective clothing that will not be re-used must be disposed of with the mould-contaminated waste.

9.1.3 Large area – greater than 3 m² of mould

Before starting any remediation, suitable barriers and clearly visible signs warning of the remediation work must be set up at a distance from the work site. A contact person can be identified on the signage for worker or occupant questions.

Where a remediation is conducted where walls do not already enclose the operation, the spread of contaminated debris from the work area must be prevented by the construction of a negative pressure enclosure.

The negative pressure enclosure must be constructed of a minimum of two layers of 6-mil polyethylene or other suitable material, with reinforced polyethylene on the floors.

The negative pressure enclosure must have at least four air changes per hour and a minimum pressure differential of at least -5 Pa (-0.02 inches of water gauge) relative to the air outside of the enclosure must be maintained. The negative pressure enclosure must be kept under negative pressure for the duration of the operation. All air exhausted from the negative pressure enclosure must pass through a HEPA filter and then be vented to the outside of the building.

All mechanical ventilation in the contaminated area, except that required to provide the negative air pressure, must be disabled and a barrier of 6-mil polyethylene placed over all openings in the contaminated area. All openings in the contaminated area, including windows and doors, must be adequately sealed with adhesive tape or isolated by one layer of 6-mil polyethylene sheeting.

All entry points to the work site must carry prominently displayed warning notices that identify a remediation activity, and forbid entry to anyone not wearing appropriate respiratory protection and

protective clothing. A separate worker and waste decontamination unit must be connected to the work site.

9.2 Decontamination and Waste from Mould Remediation

The worker decontamination unit must consist of two interconnecting rooms including:

- a clean room suitable for changing from street clothes and for storing clean clothing and equipment; and
- an equipment room suitable for removing the protective clothing and for storage of the contaminated equipment.

The waste decontamination unit must consist of two interconnecting rooms including:

- a clean room suitable for cleaning any equipment to be removed or for double bagging of waste; and
- a hold room suitable for the storage of waste until it can be removed by a second worker accessing the room from the exterior of the contaminated work area.

The worker and waste decontamination units must be constructed such that overlapping curtains of polyethylene sheeting or other suitable material are fitted to each side of the entrance and exit to each room.

The worker and waste decontamination units must be arranged in sequence and constructed so that every person, or any waste or equipment, entering or leaving the work area must pass through each room of the corresponding decontamination unit.

A competent person must inspect the work area for defects in the enclosure, barriers and worker decontamination unit:

- at the beginning of each shift;
- at the end of a shift where there is no shift to follow; and
- at least once each day on days when there are no shifts.

Any defect found on inspection must be remedied immediately and no work, other than necessary repair work, shall be performed in the contaminated area until the repair work is completed.

Only persons wearing appropriate protective clothing, eye protection, appropriate gloves, and a minimum of full-face mask and P100 or HEPA filters, respiratory protection and appropriate protection for any controlled products are allowed to enter the contaminated area.

Washing facilities for hands and face must be made available to workers in the work area and workers must wash before leaving the work area.

Movable contaminated non-porous equipment within the work area should be cleaned either with an appropriate solution of soap or detergent and water and then removed from the work site. Fixed contaminated non-porous equipment within the work area must be cleaned with an appropriate solution of soap or detergent and water and protected from further contamination during the remediation.

At the end of work, workers must:

- remove gross visible contamination from their protective clothing and respiratory protection in the work area;
- enter the equipment room of the worker decontamination unit and remove all debris from their respiratory protection equipment with the use of a vacuum cleaner equipped with a HEPA filter;
- remove all debris from the work clothing with the use of a vacuum cleaner equipped with a HEPA filter and then remove all clothing and store it in a suitable manner;
- place disposable clothing in 6-mil polyethylene plastic bags to be disposed of with the contaminated waste;
- pass into the clean area, remove and thoroughly clean the respiratory protection equipment, store it appropriately, dress and leave through the clean area door.

Electrical circuits inside the contaminated area must be deactivated unless equipped with ground-fault circuit interrupters.

All contaminated material must be cleaned up frequently and immediately upon completion of the work, bagged in 6-mil polyethylene bags, sealed and disposed of. All bags of waste and contaminated protective clothing must be removed from the work area through the waste decontamination unit.

Bags of waste and contaminated protective clothing must be sealed and removed from the work area by the following procedure:

- remove visible contamination on the outside of the bags in the work area;
- transfer the bags to the container clean room and place the bag in a second bag;
- transfer the bagged waste to the adjoining hold room and then out of the decontamination unit for disposal as soon as possible;
- bags are to be removed by the most direct exit route (e.g., a window or exterior door connected to the decontamination unit); and
- workers disposing of bags must be aware of the contents, take measures to avoid ruptures and be trained in how to deal with such an event.

Contaminated equipment, tools and other items used in the work area must be cleaned with an appropriate solution prior to removal from the negative pressure enclosure. All surfaces inside the negative pressure enclosure must be vacuumed with a vacuum cleaner equipped with a HEPA filter or wet wiped with an appropriate solution of soap or detergent and water.

9.3 Post Remediation Activities

Final air clearance testing inside the negative pressure enclosure should be performed before the enclosure is removed if and when susceptible individuals (e.g., those allergic to mould, those with low immunity, babies whose lungs are not completely formed, etc.) will reoccupy the area. Concentration of mould inside the negative pressure enclosure determined from the air clearance testing should be qualitatively and quantitatively similar to that of outside air or a background sample obtained from an uncontaminated area of the building before the enclosure is removed.

All polyethylene sheets used to form the negative pressure enclosure, the worker and waste decontamination units, and the covering of all openings inside the contaminated area must be

bagged in 6-mil polyethylene bags, sealed and disposed of. The sealed polyethylene bags containing contaminated material may be disposed of in a licensed landfill or by incineration.

10 References

Investigation, Assessment and Remediation of Mould in Workplaces, SAFEWork MB, July 2015

Indoor Air Quality – Moulds and Fungi, Canadian Centre for Occupational Health and Safety, January 8, 2021

Air Contaminants and Health – Mould, Government of Canada, February 13, 2023

Guide to Addressing Moisture and Mould Indoors – Health Canada, January 2023

11 Document History

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1	2025-09-15	Initial Release	Caroline Gebel