Université d'Ottawa | University of Ottawa

Mould Control and Water Damage Restoration Program

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Facilities

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Contents

Version Control Table

Version Number	Owner	Approver	Change Summary	Status

1. Purpose

This Mould Control and Water Damage Restoration Program describes the procedure to prevent, identify, and remediate mould and water damaged materials at the University of Ottawa. In order to prevent individuals from being exposed to high levels of airborne mould, the University must implement proper precautions and work procedures whenever Mould Control and Water Damage Restoration is performed. This Program also aims to create awareness among employees and to minimize remediation by way of prevention and by implementing strategic response measures.

2. Objective

The main objectives of this Mould Control and Water Damage Restoration Program are:

- To prepare Facilities employees of the University of Ottawa to respond adequately and efficiently in cases of water damage on campus in order to prevent undesirable mould growth and any subsequent additional property damage to University buildings.
- To increase employee awareness of the potential health hazards associated with exposure to mould.
- To assist in providing a safe environment for occupants by minimizing the potential risks associated with exposure to mould.
- To minimize remediation costs by way of preventive maintenance.
- To ensure compliance with the general duty clauses (Sections 23, 25(2)(h) and 27) of the *Occupational Health and Safety Act*.

3. Application

This program applies to all buildings, owned and leased, where the University of Ottawa is responsible for the operation and maintenance of the facilities. All workers of the University of Ottawa and contractors performing work related to water damage or mould-affected materials identified, or work on behalf of the University of Ottawa, must meet the requirement of this program. Workers must provide proof of training to the University of Ottawa before any work begins.

4. Definitions

Air conditioner
Helps remove moisture from air by cooling the air drawn over the coils by means of an internal refrigerant.

Air scrubber

A device that removes contaminants from the air in an enclosed space and prevent the contaminants from escaping into other parts of the building. It creates a negative air-pressure vacuum that draws air through a HEPA filter to remove contaminants and can be used to filter and recirculate air within a space, or it can be attached to ductwork to exhaust contaminated air out of a building.

Amplification site
A location which, due to a suitable nutrient base and water content, is fostering fungal growth.

Canister or cartridge
A container filter, sorbent, or catalyst or combination of these items, which removes specific contaminants from the air passed through the container.

Class of water intrusion
A classification that describes the estimated evaporation load; it is used when calculating the initial humidity control (e.g., dehumidification, ventilation).

Clearance tests
Environmental tests (e.g., air samples, tape lifts, swabs) taken as a quality assurance measure after mould abatement or water damage restoration has been completed.

Competent person
A person who is qualified because of knowledge, training, education and experience as outlined in the *Occupational Health and Safety Act*. The training should include, but is not limited to, the following topics: identification, prevention and control of mould; mould remediation – standard operating procedure (SOP); water damage – standard operating procedure (SOP); respiratory protection training; and use of PPE. The person must also be able to carry out mould assessments, conduct sampling, and carry out mould abatement procedures.

Dehumidifiers
Equipment used to help remove moisture from the air by drawing air over cold coils to condense out its moisture before passing the air over warm coils or a desiccant media and recirculated it back into the space.

Designated substance
Hazardous materials (asbestos, lead, silica, mercury and others) designated by the Ontario Ministry of Labour, Immigration, Training and Skills Development as per O.Reg. 490/09 – Designated Substances made under the *Occupational Health and Safety Act*. Property owners must notify contractors bidding on projects of the presence of Designated Substances. In addition to O.Reg. 278/05 on asbestos, the Ontario Ministry of Labour, Immigration, Training and Skills Development has issued guidelines for the potential exposure to silica, lead, mercury and isocyanates on construction projects.

Containment/enclosure
Polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required, that provides a continuous membrane to protect underlying surfaces from damage and prevents the escape of airborne contaminants through

sheeting into occupied areas. In some situations, sheeting must be rated as fire retardant for 45 minutes.

Evaporation load
The anticipated amount of water vapour added to a drying environment due to wet material evaporation. Evaporation load is affected by several factors, including concentration of moisture in the air, the water vapor pressures of wet materials, temperature of wet materials, air movement across wet surfaces and access to wet materials.

Fit test
A qualitative or quantitative method used to evaluate the fit of a specific make, model and size of respirator on an individual in accordance with CSA Z94.4. Fit tests are only valid for two years.

Heating units and space heaters
Equipment used to raise the temperature by introducing warm air into a space, allowing moisture to evaporate from the interior of an occupied space.

HEPA Filter
A high efficiency particulate air (HEPA) filter is capable of trapping and retaining particles greater than or equal to 0.3 micrometers in diameter, at a minimum efficiency of 99.97%.

High velocity air mover
A device that offers high velocity airflow, which can help dry surfaces faster following water damage.

HVAC
A heating ventilation and air conditioning (HVAC) system refers to the equipment and distribution system used for heating, ventilating and cooling to help maintain good air quality in a space for comfort, health and safety of occupants.

Low evaporation materials
Materials which, due to their porosity, permeance or internal structure, are slow to absorb or transmit water and tend to retain water. Low evaporation materials may include, but are not limited to, plaster, wood, concrete, and masonry.

Moisture meter
An instrument used to determine the percentage of moisture in a material.

Moulds
Fungi, mould or mildew are microbiological organisms that can live, reproduce, and potentially cause health problems in indoor environments. Most moulds need moisture to grow, will develop on any organic material (drywall, ceiling tiles, wood, paper, carpet backing, etc.), and reproduce by the production of spores.

Mould remediation
The treatment of mould contamination by cleaning or removing the contaminated material.

Polyethylene sheeting

Polyethylene sheeting (or rip-proof polyethylene sheeting) is 0.20 mm (8 mil) fabric that features a 0.13 mm (5 mil) weave and two layers of 0.04 mm (1.5 mil) poly laminate, available in sheet sizes to minimize joints.

P100 respirator filter cartridge
A respirator particulate filter that is 99.97% efficient at stopping a 0.3 micrometer aerosol, and is resistant to oil droplets. It is a classification of particulate filters set by NIOSH.

Restoration firm
Consists of competent persons that are first responders following damage from a flood, fire, water damage, sewage backup and other major events. The restoration firm is partly responsible for the primary assessment, cleaning and remediation to preserve and protect the local area and its contents to prevent further damage.

Susceptible occupants
Persons with elevated risks of reacting to mould exposure, usually due to allergic pre-disposition or compromised immune state. Examples include, but are not limited to, infants under 12 months' old, persons recovering from recent surgery, or people with immune suppression, asthma, severe allergies, sinusitis or other chronic inflammatory lung diseases.

Thermo hygrometer
A hand-held device used to measure humidity levels in a building. All hygrometers should be calibrated before use to ensure accurate results.

Ventilation unit
Moves outdoor air into a building or a room and distributes the air within the space.

Wet/dry HEPA vacuum
An industrial grade, HEPA-filter equipped vacuum cleaner that can also collect liquids.

5. Legislation

There are no provincial or federal laws or regulations specifically for mould control in public buildings. However, section 25(2)(h) of Ontario's *Occupational Health and Safety Act* stipulates that every employer is required to "take every precaution reasonable in the circumstances for the protection of workers." Constructors and supervisors (sections 23 and 27, respectively, of the *Occupational Health and Safety Act*) also have a legal responsibility to ensure the health and safety of workers and residents. Ensuring the health and safety of workers also includes protecting them from the potential health hazards posed by the presence of mould in the workplace and various properties.

It should be noted that guidelines that can be used to help apply the provisions the *Occupational Health and Safety Act* are listed in the resource section herein.

6. Roles and Responsibilities

Prior to conducting any work, the person coordinating work shall consult the appropriate designated substances report(s) and relevant amendments. These reports, along with the asbestos

management program, must be read in conjunction with the *Occupational Health and Safety Act*, and in particular, with Regulation 278/05.

General

This section outlines the responsibilities at the University of Ottawa for implementing the mould control and water damage restoration program.

Facilities

Facilities Services is primarily responsible for managing any water damage occurring in University of Ottawa buildings, *including residence buildings*. Within Facilities, these are the roles and responsibilities of the groups listed below:

Operations

- Communicate with the occupants and/or the facility manager
- Complete work using appropriate personal protective equipment as outlined in this document
- Notify the Operations Environmental Health and Safety Officer of all mould contamination discovered
- Housekeeping Services to report any water damage
- Report all initial signs of potential mould growth to the Disaster Restoration and Building Envelope Group
- Ensure that HVAC systems are inspected on a regular basis for any signs of mould growth
- Call Centre to dispatch appropriate team for response.

Disaster Restoration and Building Envelope Group

- Act as first response in the event of water damage or potential mould presence
- Evaluate the extent of water damage and the potential for mould contamination
- Within the first 24 hours, conduct initial assessments of water damage events
- Submit requests for third party remediation if walls show signs of humidity; use the humidity meter if necessary
- make, or arrange for, the final repairs by the architectural group
- Deploy structural drying equipment for localized Category 1-to-3 conditions, where possible
- Perform Level 1-to-3 mould remediation, if required
- Retain third-party environmental consultants and contractors to conduct mould assessment or remediation as needed.
- Provide designated substances reports to third-party contractors/subs.

Supervisors/Management

- Ensure that workers comply with applicable guidelines and regulations
- Ensure that workers use or wear the equipment, protective devices, or clothing that the worker's employer requires to be used or worn

- Ensure that all mould-related activities are performed in accordance with the procedures established under the Mould Control and Water Damage Restoration Program
- Ensure that employees who are permitted access to areas where mould contamination is being disturbed have been properly trained

University employees and Students

- Comply with all access control restrictions posted at work sites
- Immediately report any suspected (or potential) mould contamination in their work, study, or living environment to their supervisor, residential councillor/ambassador, a Facilities officer,Protection Services or by dialing 2222.
- Immediately report any water leaks, spills, seepage, flooding etc. in their work, study, or living environment to their supervisor, residential councillor/ambassador, a Facilities officer, Protection Services, or by dialing 2222

External Contractors and Sub-Trades

- Review the designated substances reports prior to proceeding with any work activities
- Comply with the requirements of the University of Ottawa Mould Control and Water Damage Restoration Program
- Ensure that all communications are directed solely to their respective uOttawa contacts
- Ensure that all employees under their direction are properly trained in the hazards of mould and water damage, control procedures prior to conducting any mould remediation work, and that they are provided with training documentation prior to the start of work
- Ensure that workers immediately stop all work and notify the department contracting the work if/when previously unidentified mould contaminated materials or other hazardous materials are discovered during the work
- Ensure that any water damage incidents are reported and responded to promptly
- Ensure a thorough documentation of work, including scope of work, email communications, final reporting, and pictures before, during, and after work activities.

Operations Environmental Health and Safety Officer

- Regardless of which department initiates the work, ensure that all work involving mould and water damage is conducted only by qualified employees or qualified external contractors, that safe work procedures are in place, and that all other requirements of the Mould Control and Water Damage Restoration Program are implemented
- Assess conditions for potential mould contamination and recommend appropriate remediation measures
- Respond to findings of mould-contaminated material during project activities and ensure that appropriate clean-up and remediation measures are taken in a timely manner
- Maintain records of all mould remediation and water damage restoration work

Facility Managers

- In situations where the mould investigation is triggered by an occupant or occupants experiencing symptoms, refer the case to Health and Wellness.

- Facilitate the work that needs to take place and coordinate occupancy and space availability.
- Act as liaison between Facilities and occupants.
- Report any mould and water damage incidents to Facilities.

Joint Health and Safety Committee (JHSC)

The JHSC has a right to the following documents and information, when requested:

- A copy of any coordination document;
- A copy of the program;

The JHSC also has the following rights with respect to consultation:

- Be consulted by the University of Ottawa if the Mould Control and Water Damage Restoration Program is being developed, updated or reviewed
- Be consulted if worker training is being developed
- Be consulted by the University of Ottawa during any annual review of Mould Control and Water Damage Restoration Program training, as well as when circumstances change
- Be given the opportunity to attend the beginning of industrial hygiene testing and air quality testing.

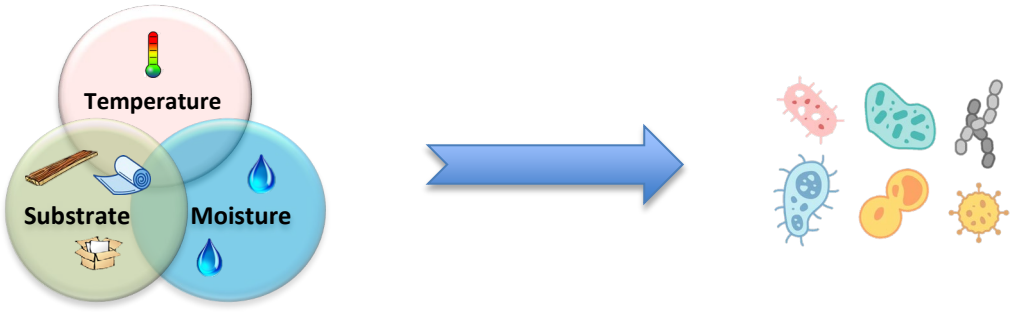
7. Mould

Background on Mould

Moulds are microscopic organisms that are present throughout the natural world. Mould spores are always present in buildings. Together with mushrooms and yeasts, moulds constitute the fungi kingdom, which are a group of micro-organisms that play an essential role in the natural environment by decomposing dead organic matter.

Moulds can be carried indoors by the wind, insects, in dirt, on clothing or by ventilation equipment, and it becomes a problem when it starts growing in indoor environments. Mould can grow indoors when spores on susceptible building materials (i.e. drywall, wood, insulation, ceiling tiles, etc.) become wet long enough to allow the spores to germinate, grow and multiply.

Primary Factors for Mould Growth



For mould spores to germinate and mould to spread, three main conditions must be present: a **suitable temperature**, **appropriate substrate/nutrient base**, and **moisture**. All conditions are summarized in the Table 1 below.

Table 1. Ideal factors and conditions for mould to grow and that accelerate growth

Factor	Ideal Conditions for Mould Growth
Temperature	• From 5 to 38°C (practically all surfaces in a building are within this range of temperatures at least part of the year.)
Substrate	• Materials that contain organic matter (wood, paper, drywall, plaster, natural textiles, ceiling tiles, carpet backing, soil in basements, crawlspaces or potted plants, dust, etc.). • Although moulds generally prefer natural materials to synthetic ones, some will grow on plastics or metals. • Other types of material may contain enough dust, dirt, soil and moisture to sustain mould colonies (HVAC equipment, ductwork, mineral wool insulation, synthetic textiles, vinyl, rubber, glass, electrical equipment, etc.).
Moisture	• Relative humidity in ambient air greater than 60% • Water damage (category 1, 2, 3) • Humidity in materials reaching 75% • Wood containing more than 24% moisture • Mould-contaminated materials also tend to absorb and retain moisture.
	Additional Factors and Conditions
Air Velocity	• Stagnant ambient air • Air velocity less than 2 feet/second • Activating fans close to mould growth will disperse more spores
Light	• Darkness or dimness
Sources of Water Damage	• Water damage from different sources may carry various levels of microorganisms and bacteria that could amplify microbial growth (i.e., sink faucet, dishwasher discharge, sewage backup, roof leak, pipe burst, water infiltration). The IICRC divides water damage into three types: category 1, 2 and 3
Historical Water Damage	• Mould grows more rapidly on sites of past contamination.
Duration	• Probability of mould growth increases after 24-to-48 hours of water saturation in ideal conditions.

Recognizing Mould Contamination

Because water is essential for mould growth, it is important to notice signs of water leakage or damage:

- flooding, dripping, leaks, seepage, spills, condensation
- musty odours

- sewage backup
- stained carpets, walls, ceiling tiles or pipes
- rusty metal
- loose vinyl baseboards, spalling masonry finishes, broken drywall seams
- softened wood or drywall
- powdery mineral deposits on walls or concrete, after water has evaporated
- damp filters and other damp sites in HVAC systems

The photographs shown below are typical views of what mould growth may look like:



Ceiling tiles, gypsum wallboard and cellulose material (cardboard, paper, wood, etc.) should also be examined carefully. Mould-contaminated materials often show stains or coloured spots (usually greenish black or grey, but can also be white, pink or yellowish orange) with a downy or powdery texture.

However, mould contamination is not always visible to the naked eye or within the living or working space; it can stay hidden under the floor or carpet, above the ceiling tiles, or in the wall cavity. In this case, musty, earthy or mouldy odours, as well as symptoms affecting building occupants, can reveal the presence of mould. Moisture and relative humidity measurements can help in identifying potential mould growth. Furthermore, mould air sampling can be used to indicate the presence or absence of a of potential mould.

Air sampling for mould should only be considered after

- Indoor air quality program steps have been followed and deemed necessary, and
- Upon completion of select Level II and all Level III mould remediation activities prior to dismantling the enclosure.

Listed below are common sites of where potential mould growth could occur:

- bathrooms
- kitchens
- crawlspaces and tunnels
- windows and outside doors
- roof spaces and ceilings
- basement floors
- unheated or poorly insulated rooms and closets
- areas of condensation such as mechanical rooms, bulkheads, ventilation conduits, and air handling units
- inadequate (poor) ventilation

- poor air filtration can spread mould around. If mould is found, the HVAC filters need to be monitored and or changed in case they have been compromised
- inadequate HVAC insulation

Mould Prevention Measures

Here are some measures that helps prevent mould in building fabrics and HVAC systems:

Humidity control

Relative humidity is a percentage that indicates the amount of moisture in the air relative to the maximum amount of moisture the air can hold, at a given temperature. Ways to control humidity includes:

- Indoors, maintain relative humidity below 60% to prevent condensation.
- Provide adequate exhaust fans for shower moisture to help prevent humidity from building up.
- Ensure even heating of buildings during winter to prevent condensation on interior walls and exterior corners of rooms.
- Increase air movement on surfaces to prevent moisture build-up on surfaces.
- Insulate cold surfaces to prevent condensation.
- Store vulnerable materials and contents on raised and adequate surfaces.
- Avoid storing vulnerable materials in refrigerated or incubated environments.

Preventative maintenance:

- Maintain caulking in bathrooms, showers, and exterior locations
- Avoid installing carpets on cool floors, such as concrete, to prevent condensation
- Immediately respond to any water infiltration and minor dripping or leaking from pipes
- Cover dirt with plastics in crawlspaces and keep these areas well-ventilated
- In the event of a flood:
    - remove the water by pumping or vacuuming as soon as possible
    - if possible, dry construction and finishing materials within 24 hours to bring the relative humidity at the surface down to between 30% and 50%
    - discard non-salvageable materials, i.e. materials that have been wet for an extended time or contaminated by sewage water (wallboard, drywall, ceiling tiles, carpets, paper, insulation materials, upholstered furniture, etc.).

HVAC maintenance:

HVAC equipment must be properly maintained to prevent mould from growing inside and spores from being dispersed throughout the buildings.

- To reduce the number of spores entering the space, use the highest grade filters compatible with the system

- Maintain bird screens at air intakes and keep roosting birds away from air intake areas
- Ensure that cooling towers are regularly treated with biocides
- In damp sections of ductwork, avoid porous insulation or replace it with non-porous insulation
- Keep spray washers, sumps and drip pans well drained and free of slime
- Regularly inspect and permanently repair all areas in HVAC equipment where water is collected or leakages occur
- Operate the HVAC system in ways that avoid the formation of water droplets from dehumidification cooling coils, water spray systems and humidifiers, and prevent air from hot and cold decks from mixing;
- Ensure HVAC systems are regularly cleaned.

Equipment required to help prevent and identify humidity includes:

- Dehumidifiers
- Air conditioners
- Heating units and space heaters
- High velocity air movers
- Air scrubbers
- Ventilation units
- Thermo hygrometers
- Moisture meters
- Wet/dry HEPA vacuums

Mould-Related Health Effects

Mould exposure is not expected in workplaces where there are no mould amplification sites, and as such, it should not present a health hazard except to very susceptible individuals (i.e. those with pre-existing medical conditions). In situations where indoor mould amplification sites are present, the risk from exposure to mould increases. Potential health effects from mould exposure may include:

- throat irritation, cough, hoarseness, chest pain
- aggravation of asthma
- eye irritation
- nasal irritation and congestion, sinus problems, runny nose
- headaches
- chronic fatigue
- difficulty concentrating
- skin rash
- cold-like or flu-like symptoms in general

These symptoms could be due to

- an **allergic reaction** when spores are airborne or the mould growth is disturbed
- an **infectious disease** after exposure to pathogenic moulds usually associated with bird or bat droppings
- a **toxic response** arising from inhalation or skin contact with toxigenic moulds (i.e. moulds that naturally produce toxins) or after exposure to high levels of many moulds

8. Mould Remediation

All mould remediation work should follow University of Ottawa standard operating procedures (SOP), Appendix A and B. The University of Ottawa recognizes the three (3) main levels of mould remediation: Level I, II, III. The classification of these levels is based on *Environmental Abatement Council of Ontario (EACO)'s Mould Abatement Guideline (2015)* and the Canadian Construction Association – (CCA) Mould Guidelines for the Canadian Construction Industry.

Level I: Small isolated areas less than 10ft^2 (1m^2) of building material or clean-up of less than 10ft^2 (1m^2) of mould growth in HVAC

Level II: Medium areas, 10-100 ft^2 (1-10m^2) or less than 10 ft^2 (1 m^2) in HVAC systems in occupied areas

Levels III: Large area, more than 100 ft^2 (10 m^2), or more than 10 ft^2 (1 m^2) in HVAC systems

Whether or not symptoms develop in individuals exposed to mould depends on the nature of the fungal material and its concentration, the duration of exposure, and the sensitivity of the person. Particularly susceptible individuals (i.e. infants and young children, individuals with a lung condition, asthma, bronchitis, hay fever, pre-existing allergies to mould, etc.) or impaired immune functions (organ transplant recipients, persons with diabetes or HIV, chemotherapy patients, etc.) tend to express symptoms.

During the remediation activity, the mould-contaminated material is disturbed and large amounts of mould spores and other parts of the organism become airborne due to the disturbances. To prevent individuals from being exposed to high levels of airborne mould, proper precautions and work procedures must be implemented whenever mould remediation is being performed.

Employees or students who suspect poor indoor air quality or experience mould exposure-related symptoms can complete the Indoor Air Quality Appendix Form - **Occupants Symptoms and Health Effects Air Quality Complaint** and submit it to the Health and Wellness office. Their supervisor is responsible for completing a preliminary investigation using the **Supervisor Checklist** within the same document. Supervisors may submit a service request to Facilities by dialing 2222 or by sending an email to sdiprs@uottawa.ca following their investigation.

In terms of industry guidelines that prescribe remediation protocols for mould remediation, there are several that should be followed, such as:

- Environmental Abatement Council of Ontario (EACO)- Mould Abatement Guideline
- Canadian Construction Association – (CCA) Mould Guidelines for the Canadian Construction Industry
- Institute of Inspection Cleaning and Restoration Certification (IICRC S520/R520) – Standard Reference Guide for Professional Mould Remediation

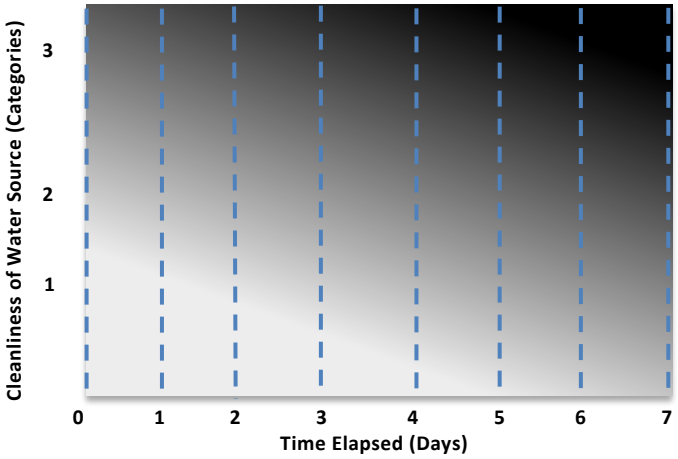
9. Water Damage

Background on Water damage

Usually, water damage occurs in buildings due to an incident, such as flooding, sewer backup, condensation, or water loss. The Institute of Inspection Cleaning and Restoration Certification (IICRC) S500 Standard and Reference Guide for Professional Water Damage Restoration (IICRC S500), is the primary guideline to follow when structural drying and/or remediation work is required. The IICRC S500 outlines the procedures and precautionary measures to follow when conducting water remediation activities due to water leaks, sewage backflows, water infiltrations and in other areas when water loss conditions may occur.

The effects of time on microbial growth by water category are summarized in the chart below.

Summary of Effects of Time on Microbial Growth



On this chart, the darker the colour, the more mould growth occurs.
Note that only a competent person or specialized firm shall determine the different categories and classes.

Categories

The IICRC S500 divides water into three types: **Category 1, Category 2,** and **Category 3**. The following excerpts are taken from the IICRC S500, which defines each water category.

Category 1

Water that originates from a sanitary water source and does not pose substantial risk from dermal, ingestion, or inhalation exposure. Examples of Category 1 water sources include, but are not limited to: **broken water supply lines, tub or sink overflows with no contaminants; appliance malfunctions involving water-supply lines; melting ice or snow; falling rainwater; broken toilet tanks, and toilet bowls that do not contain contaminants or additives**. However, once clean water leaves the exit point, it may not remain clean once it contacts other surfaces, materials, or touches the ground.

The cleanliness of Category 1 water may deteriorate to Category 2 or 3 for many reasons, including but not limited to: contact with building materials, systems and contents, and/or mixing with soils and other contaminates. The factors that influence a structure's potential organic and inorganic load include: the age and history of the structure, previous water losses, general housekeeping, the use of the structure, elapsed time, and elevated temperature.

Category 2

Water that contains significant contamination and has may cause discomfort or sickness if human come into contact or consume it. Category 2 water can contain potentially unsafe levels of microorganisms or nutrients for microorganisms, as well as other organic or inorganic matter (chemical or biological). Examples of Category 2 water include: **discharge from dishwashers or washing machines; overflow from washing machines; overflows from toilet bowls on the room side of the trap with some urine but no feces; seepage due to hydrostatic pressure; broken aquariums or punctured water beds.**

The cleanliness of Category 2 water may deteriorate to Category 3 for many reasons, such as contact with building materials, systems and contents, and its mixing with soils and other contaminates. The factors that influence a structure's potential organic and inorganic load include: the age and history of the structure, previous water losses, general housekeeping, the use of the structure, elapsed time, and elevated temperature.

Category 3

Category 3 water is grossly contaminated and can contain pathogenic, toxigenic or other harmful agents. Examples of Category 3 water can include, : **sewage; toilet backflows that originate from beyond the toilet trap regardless of visible content or colour; all forms of flooding from sea water, ground surface water or rising water from rivers or streams, and other contaminated water entering or affecting the indoor environment, such as wind driven rain from hurricanes, tropical storms, or other weather-related events**. Such water sources may carry silt, organic matter, pesticides, heavy metals, regulated materials, or toxic organic substances.

Classes

It is also important to estimate the amount of humidity control needed to begin the drying process. One component of the humidity control requirement is the **class of water intrusion**, which classifies the estimated evaporation load and is used when calculating the initial humidity control (e.g., dehumidification, ventilation). This classification is based on the approximate amount of wet surface area as well as the permeance and porosity of affected materials remaining within the drying environment at the time drying is initiated.

Information needed to determine class should be gathered during the initial inspection process conducted by a competent person. The classes are divided into four separate descriptions: **Class 1, 2, 3, and 4**.

Class 1

Low amount of water absorption and evaporation load where wet porous materials (e.g., carpet, gypsum board, insulation, concrete, masonry, textiles) represent less than about 5% of the combined floor, wall and ceiling surface area in the space. Conditions include materials described as low evaporation materials (e.g., plaster, wood, concrete, masonry or multilayer assemblies) with minimal absorbed moisture.

Class 2

Significant amount of water absorption and evaporation load where wet, porous materials (e.g., carpet, gypsum board, insulation, concrete, masonry, textiles) represent between about 5% and 40 % of the combined floor, wall and ceiling surface area in the space. Conditions include materials described as low evaporation materials (e.g., plaster, wood, concrete, masonry or multilayer assemblies) with minimal absorbed moisture.

Class 3

Large amount of water absorption and evaporation load where wet, porous (e.g., carpet, gypsum board, insulation, concrete, masonry, textiles) represent more than about 40 % of the combined floor, wall and ceiling surface area in the space. Conditions include materials described as low evaporation materials (e.g., plaster, wood, concrete, masonry or multilayer assemblies) with minimal absorbed moisture.

Class 4

Deeply held or bound water that involves a significant amount of water absorption into low evaporation materials (e.g., plaster, wood, concrete, masonry) or low evaporation assemblies (e.g., multilayer wallboard, multilayer subfloors, gym floors, or other complex, built-up assemblies). Drying may require special methods, longer drying times, or substantial water vapour pressure differentials.

10. Responding to water damage and infiltration

Precaution and Safety Measures

Asbestos

Workers must take all necessary precautions if any asbestos-containing material needs to be disturbed. The contractors must be informed of any materials containing asbestos. Please refer to the University of Ottawa Asbestos Management Program, and the Designated Substance Reports and PPE program that apply.

Electrical and Mechanical

- Workers must consider all wet wiring, lighting fixtures and electrical outlets as shock hazards until they have been checked; therefore, they must have everything checked by an electrician.
- Workers must refer to and apply the University of Ottawa lockout/tagout (LOTO) procedure if water is found near or touching electrical or mechanical equipment.
- Workers must follow the ground fault circuit interrupters (GFCIs) procedure if electrical hazards are present.
- All motors and fixtures that were wet need to be dismounted, cleaned and air-dried. Workers must make sure that no moisture is present and that control measures have been put in place before using.

Wet surfaces

Water on floors may render it slippery and increase fall hazards. Workers must wear appropriate footwear ,be mindful and careful when moving on and around wet surfaces. Ensure that proper housekeeping measures are put in place.

Working at heights

If working at heights is required for the work to be completed, Working at Heights training with a training provider approved by the Ministry of Labour, Immigration, Training and Skills Development is required.

Mould

Because of the potential health risk associated with mould, all mould remediation must be performed by a competent person or restoration firm.

The objective of mould remediation is to remove all mould affected materials and all associated dust and spores. This requires special precautions. The proper cleaning of a mouldy workplace is a three-step process:

1. Removal of gross mouldy materials, including all porous materials supporting mould growth using proper personal protective equipment
2. Cleaning all settled dust within the contaminated area using a HEPA-filter vacuum.
3. Wet cleaning with a cleaning agent and a disinfecting agent.

11. Water damage restoration

Preliminary Determination

A preliminary determination should be conducted to determine the category of the water damage. While Category 1 water damage can be restored without provisions for controlling contamination (i.e. enclosures, negative air pressure, PPE, respirators, etc.), Category 2 and 3 water damage will require

upfront remediation steps to control potential contaminants before undertaking restorative drying procedures. It is also important to not only consider the original source, but also the quality after it contacts or passes through various materials. These conditions, along with time and temperature, can further degrade water quality and affect the category. Category 2 and 3 water damage must be addressed by a competent person or professional third-party restoration firms and environmental consultants over the course of the restoration process.

Some additional factors to consider include:

- Public health concerns
- Type of occupancy (elderly, childcare, immunocompromised individuals)
- Presence of hazardous materials or other contaminants
- Indoor air quality concerns
- Level of impact to building operation

Moisture Evaluation

It is also important to conduct an initial moisture evaluation to determine the extent of the water damage along with the type of materials and contents that have been affected. This evaluation should include the various layers of building material (i.e., assemblies) and the porosity of the materials. The evaluation should begin at the source of the water damage and trace its extent across and beneath various surfaces in all directions.

Moisture meters and thermal imaging cameras are useful in tracing the extent of water damage and in determining a dry standard as reference for acceptable moisture content in building materials that were not affected. Depending on the building materials or assemblies, destructive testing may also be required to evaluate hidden or trapped moisture.

Mapping out the moisture will help determine the class of water damage, and recording moisture readings will document the extent of water migration, including any complexities and drying limitations that may be present. Mapping will also help determine the restorative drying process requirements, including the quantity and type of drying equipment required.

Materials that are not likely to be salvaged can also be assessed for removal and disposal. Sensitive materials such as valuable items and confidential documents (e.g. library books, special collections, paintings) may require specialized restoration procedures (i.e. professional freeze drying and detailed decontamination procedures) that may only be carried out off site.

As restorative drying procedures are implemented, moisture and humidity readings should continue to be collected regularly to evaluate the process and verify when drying is complete.

Category 1 Water Damage

Water damaged identified as Category 1 is considered to have originated from a clean or sanitary source and does not contain potential contaminants. If such a type of water damage is limited to small or localized areas, restoration may be performed by the uOttawa Disaster Restoration/Building

Envelope team. However, larger Category 1 water damage, (i.e. multiple floors, or requiring significant equipment) should only be handled by a qualified restoration company.

In these conditions, the bulk of the water should be extracted as soon as possible. Effective water extraction will aid in the drying process by minimizing the time required for evaporation through structural drying. It can also reduce the amount of equipment needed throughout the drying process and improve drying efficiency. Extraction can also be repeated as water seeps out of building materials and components.

Consider these general points when mitigating Category 1 water damage:

- Respond within the first 24 hours.
- Determine if other hazardous building materials or conditions are present.
- Dike and curb bulk water to prevent it from spreading.
- Extract bulk water as soon as possible.
- Conduct a thorough moisture evaluation of the affected building materials.
- Identify areas with trapped moisture or contamination.
- Raise furnishings and contents above the floor, or protect them in another manner.
- Install polyethylene sheeting to locally contain the area; this may be helpful in controlling humidity
- Install dehumidifiers to control humidity and implement a process to regularly monitor and maintain them.
- If no airborne hazards are present, consider using high velocity air movers to facilitate drying.
- Maintain daily records of humidity and moisture levels.

Once the structural drying process is complete, it is important to conduct a final moisture evaluation to check if materials have been sufficiently dried to a pre-loss condition (by comparing their moisture content to that of unaffected material) before reinstatement and/or re-occupancy.

Category 2 and 3 Water Damage

Water damage identified as Category 2 or 3 is considered to contain one or more types of contaminants that can produce adverse health effects. Environments may also be contaminated as a result of pre-existing conditions (i.e. mould, asbestos, etc.). These types of water damage conditions should only be handled by a competent person or restoration firm. An environmental consultant should also be retained to provide an evaluation of the damage and conduct analytical testing as needed.

Prior to entering areas known, or suspected, to be contaminated, personnel should be equipped with proper personal protective equipment (PPE) such as Tyveks suits, gloves, boot coverings and respirators, which could consist of the following:

- Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter
- Air purifying full-facepiece respirator with N-100, R-100 or P-100 particulate filter, or
- Powered air purifying respirator equipped with a tight-fitting facepiece (half or full) and a high efficiency filter or N-100, P-100 or R-100 particulate filter.

Because contaminants can spread quickly, implement engineering controls immediately to minimize the spread of contamination. Airborne contaminants can also spread through air circulation, ventilation, and mechanical systems, which also requires implementation of control measures.

Consider these general points when mitigating Category 2 and 3 water damage:

- Isolate the HVAC and electrical systems of the affected areas
- Dike and curb solid and liquid contaminants (i.e., soil, silt, sewage, etc.).
- Raise furnishings and contents above the floor, or protect them in another manner.
- Install polyethylene sheeting to locally or fully contain the area
- Install HEPA-filtered, negative air units and/or air scrubbers to contain airborne contaminants

Carry out bulk removal of liquid or solid contamination before any required demolition or detailed cleaning procedures. Use professional extracting equipment or wet/dry HEPA vacuums to do so to minimize the risk of aerosolizing the contaminants. Manual removal may also be required if vacuuming or suction devices are not feasible.

Once bulk removal and extraction are completed, both the restoration firm and an environmental consultant should re-evaluate the affected area. Their assessment should focus on specific details pertaining to the impacted building materials and contents so that proper restoration techniques can be outlined and implemented, which may involve:

- Identifying other hazardous materials that may be present
- Safely using biocides and disinfectants to reduce the potential for microbial growth
- Controlling humidity using dehumidifiers
- Identifying areas with trapped moisture or contamination
- Using specialty equipment to control dust during demolition activities (i.e., HEPA dust collection attachments).
- Properly bagging and sealing of waste for disposal.
- Using high velocity air movers to facilitate drying (following cleaning and sanitization).
- Maintaining daily records of humidity and moisture levels.

Once the detailed cleaning and disinfection procedures are completed, consider analytical testing of the affected area prior to dismantling the containment and re-occupy the area. This may include testing surfaces for bacteria and mould along with testing for airborne mould.

12. Training and education

All employees of the University of Ottawa who may be involved in the removal or handling of mould-contaminated material during remediation should undergo appropriate training and education.

The training should include:

- Hazards of mould
- Identification, prevention ,and control of mould
- Mould remediation standard operating procedure (SOP)

- Water damage standard operating procedure (SOP)
- Respiratory protection training
- Use of PPE

The following courses and certifications through the Institute of Inspection Cleaning and Restoration Certification (IICRC) are recommended:

- Water Damage Restoration Technician (WRT)
- Applied Microbial Remediation Technician (AMRT)
- Applied Structural Drying (ASD)

13. Records

The University of Ottawa will maintain worker training records. In addition, all records of reported mould exposure must be submitted via the Accident, Incident, Occupational Illness or Near Miss form. Records of air monitoring will be filed electronically with Facilities.

In addition, all consultant documents, such as analytical results, humidity records, daily remediation reports, closeout reports and waste disposal records from contractors shall be provided to the University of Ottawa.

14. Program review

The University of Ottawa shall ensure that the Mould Control and Water Damage Restoration Program is reviewed every three years, or when there are significant changes to regulations or guidelines, to ensure that the program is being managed effectively and that workers are being adequately protected.

Key elements shall include:

a) Comparison of program elements against regulatory requirements
b) Review of documented procedures
c) Review of the program against current internal procedures
d) Examination of records to verify that documented procedures are being followed
e) Confirmation that workplace practices comply with program requirements
f) Review of the documentation of performance problems, subsequent resolution or corrective actions
g) Review of the effectiveness of training of all stakeholders
h) Review of the history of proper inspections and maintenance of engineering control
i) Post audit of the supervisor's checklist

15. References

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Institution of Inspection Cleaning and Restoration Certification: Standard and Reference Guide for Professional Water Damage Restoration –Fourth Edition - ANSI/IICRC S500-2015

Environmental Abatement Council of Ontario: Mould Abatement Guideline – Edition 3 – 2015

Health Canada 1995. Fungal Contamination in Public Buildings: a Guide to Recognition and Management. Ottawa: Health Canada.

Health Canada 2004. Fungal Contamination in Public Buildings: Health Effects and Investigation Methods. Ottawa: Health Canada. ISBN 0-662-37432-0. 47 p.

The Ontario Ministry of Labour, Immigration, Training and Skills Development website on mould in the workplace lists additional resources.

Appendix A – Standard Operating Procedure for Mould Remediation

STANDARD MOULD REMEDIATION PROCEDURE

1.0 General Precaution

PRIOR TO CONDUCTING ANY WORK, THE PERSON COORDINATING WORK SHALL CONSULT THE APPROPRIATE DESIGNATED SUBSTANCE REPORT(S) AND RELEVANT AMENDMENTS. THESE REPORTS, ALONG WITH THE ASBESTOS MANAGEMENT PROGRAM, MUST BE READ IN CONJUNCTION WITH THE *OCCUPATIONAL HEALTH AND SAFETY ACT*, IN PARTICULAR, REGULATION 278/05.

Protection of occupants

Prior to remediation, all occupants of the affected area must leave the area. Moreover, it must be determined whether occupants in adjacent areas need to leave as well.

2.0 Mould Abatement Guideline

Level I: Small isolated areas with less than 10ft^2 (1m^2) of building materials or clean-up of less than 10ft^2 (1m^2) of mould growth in HVAC

1. Workers performing Level I remediation shall wear a half-face piece air-purifying respirator fitted with replaceable filters (P95 minimum) or a filtering face piece respirator (N95 minimum) that has been fit tested to the make and model within the last two years according to CSA Z94.4 requirements and suitable eye protection, as per CCA 82 - 2018 Mould Guidelines for the Canadian Construction Industry.

2. Workers shall wear disposable coveralls and dust-impermeable gloves appropriate to the work being performed, and water-impermeable gloves when applying detergent or disinfectant. Workers can wear disposable boot covers or clean their boots before leaving the remediation area.

3. Place a drop sheet below the ceiling tile.

4. Wet the ceiling tile with a garden-type sprayer.

5. HEPA vacuum the drop sheet and place in an airtight container for disposal.

6. Clean all surfaces in the room by HEPA vacuuming and damp wiping.
7. Wash face and hands, and clean and maintain respirator after completing mould abatement.

Level II: Medium areas of 10-to-100 ft^2 (1-10 m^2), or contaminated areas less than 10 ft^2 (1 m^2) in HVAC systems in occupied areas

1. Workers performing Level II remediation shall wear a half-face piece air-purifying respirator fitted

with replaceable filters (P95 minimum) or a filtering face piece respirator (N95 minimum) that has been fit tested to the make and model within the last two years according to CSA Z94.4 requirements and suitable eye protection per CCA 82 - 2018 Mould Guidelines for the Canadian Construction Industry.

2. Workers shall wear disposable coveralls and dust-impermeable gloves appropriate to the work being performed, and water-impermeable gloves when applying detergent or disinfectant. Workers can either wear disposable boot covers or clean their boots before leaving the remediation area.

3. Isolate the work area from adjacent spaces using temporary hoarding, tape, polyethylene sheeting, etc. Provide a temporary roof if the current ceiling does not complete the temporary enclosure.

4. Eating, drinking or smoking are prohibited in the work area.

5. Occupants should not be present in the enclosed work area during removal activities.

6. Provide a space at the entrance of the containment area for workers to change into/out of coveralls and to store cleaning supplies. Provide double-overlapping covering flaps at both ends of the change room and ensure that the space is under negative pressure relative to the building's occupied areas and under positive pressure relative to the mould removal area.

7. Create a negative pressure within the enclosure by using portable, HEPA-filtered exhaust fans (negative air machines). Provide a minimum negative pressure of 5 Pascals (0.02 inches of water column) and a minimum of four air changes per hour. Discharge the filtered air outside the building and away from people.

8. Appoint a competent person to inspect the work area for defects in the enclosure, barriers, and change room.

9. Post bilingual signs at the entrance to the work area warning of the potential for mould and (where required) any asbestos hazard.

10. Before entering the contaminated work area, workers must first put on clean coveralls and a respirator in the "clean" change room. When exiting, workers must use a HEPA vacuum in the work area to remove gross contamination from their coveralls and boot covers (or separate work boots). Workers must then enter the "dirty" change room and remove dirty coveralls and boot covers, and dispose of the boot covers. Work boots used without boot covers must be removed and stored in the dirty change room. Upon leaving the work area, workers must then clean their face and hands in the wash stations.

11. Confirm the removal of all building materials up to the edges of mould-impacted materials, leaving the wall framework in place.

12. Enforce precautions during demolition to minimize particulate aerosolization.

13. Confirm whether a structural component must be removed due to mould or moisture impacts

14. Clean all surfaces and content by HEPA vacuuming and damp wiping to remove dust with settled spores.

15. Remove all waste created by the remediation work, including building debris, disposable coveralls, respirator cartridges, and plastic sheeting. Seal all waste into 6 mil nominal disposal bags. Wet wipe or clean the bags with a HEPA vacuum and finally, double bag them in a second, clean 6 mil nominal bag or suitable sealed container.

16. Clean all equipment used in the remediation work (e.g., vacuum cleaner, knives, saws) using a HEPA vacuum and wet wiping. Equipment that cannot be readily cleaned (e.g. vacuum hoses or wire brushes) shall be HEPA vacuumed and sealed in 6 mil polyethylene bags or suitable sealed container before removal from the work area.

17. Upon completion of removal and cleaning, the Environmental Consultant shall inspect the Level II work area for acceptable completion, through a combination of careful visual inspection, and air sampling. A site will be considered acceptable and clean when a thorough visual inspection shows that all the removal work has been completed and that all surfaces in the work area are free of any dust or debris. In addition, mould measurements (air samples, swabs, tape-lifts, or vacuumed dust samples) will be collected to demonstrate that the work area is no longer impacted by the mould contamination and removal process.

Level III: Large Areas, More than 100 ft^2 (10 m^2), or more than 10 ft^2 (1 m^2) in HVAC Systems

1. Workers shall wear a full-face piece air purifying respirator fitted with P100 filters, or preferably, a tight-fitting, positive-pressure, full-face piece powered air purifying respirator with high efficiency particulate filters, fit tested to the make and model within the past two years according to CSA Z94.4 requirements.

2. Workers shall wear impermeable gloves and full-body, dust-impervious coveralls with attached hoods, tightly secured with tape at the ankles and wrists.

3. Workers shall wear disposable boot covers or separate work boots that can be effectively cleaned with a HEPA vacuum or wiped clean prior to removal from the work area.

4. Isolate the work area from adjacent spaces using temporary hoarding, tape, and polyethylene sheeting, etc.

5. Create negative pressure within the enclosure by using portable HEPA-filtered exhaust fans (negative air machines). Provide a minimum negative pressure of 5 Pascals (0.02 inches of water

column) and a minimum of four air changes per hour. Discharge the filtered air outside the building and away from people.

6. Appoint a competent person to inspect the work area for defects in the enclosure, barriers, and change room.

7. Post bilingual signs at the entrance to the work area to warn of potential mould and asbestos hazard, provide contact phone number, and install a log sheet for workers to sign in and out.

8. Before entering the contaminated work area, workers must first put on clean coveralls and a respirator in the Clean Change Room. When exiting, workers must use a HEPA vacuum in the work area to remove gross contamination from coveralls and boot covers (or separate work boots). Workers must then enter the Dirty Change Room and remove dirty coveralls and boot covers, the latter to be used and disposed of. Work boots used without boot covers must be removed and stored in the dirty change room. Upon leaving the work area, workers must then clean their face and hands in the wash stations.

9. Confirm that all building materials are removed until the extents of all mould impacted materials have been reached, leaving the wall framework in place.

10. During demolition, ensure to minimize the creation of aerosol particulates.

11. Confirm whether a structural component must be removed due to mould or moisture impacts

12. All surfaces and content should be HEPA vacuumed and damp wiped to remove dust containing settled spores.

13. Remove all waste created by the remediation work, including building debris, disposable coveralls, respirator cartridges, and plastic sheeting. Seal all waste into 6 mil nominal disposal bags. Wet wipe or clean the bags with a HEPA vacuum and finally double bag in a second clean 6 mil nominal bag or suitable sealed container.

14. Clean all equipment used in the remediation work (e.g., vacuum cleaner, knives, saws) using a HEPA vacuum and wet wiping. Equipment that cannot be readily cleaned (e.g. vacuum hose or wire brushes) shall be HEPA vacuumed and sealed in 6 mil polyethylene bags or suitable sealed container before removal from the work area.

15. Once removal and cleaning are completed, the environmental consultant shall inspect the Level III through a combination of careful visual inspection and air sampling to ensure that the work area is acceptable and clean. A site will be considered acceptable and clean when a thorough visual inspection shows that all the removal work has been completed and that all surfaces in the work area are free of any dust or debris. In addition, mould measurements (air samples, swabs, tape-lifts, or vacuumed dust samples) will be collected to show that the work area is no longer affected by mould contamination and the removal process.

Appendix B – Standard Operating Procedure For Water Damage

Standard Operating Procedure for Water Damage

1.0 General Precaution

PRIOR TO CONDUCTING ANY WORK, THE PERSON COORDINATING WORK SHALL CONSULT THE APPROPRIATE DESIGNATED SUBSTANCE REPORT(S) AND RELEVANT AMENDMENTS. THESE REPORTS, ALONG WITH THE ASBESTOS MANAGEMENT PROGRAM, MUST BE READ IN CONJUNCTION WITH THE *OCCUPATIONAL HEALTH AND SAFETY ACT*, IN PARTICULAR, REGULATION 278/05.

Protection of occupants

Occupants in areas affected by Category 3 water damage must leave the area. If space permits, occupants affected by Category 1 and 2 water damage should also leave the area. In addition, it may be necessary for occupants in adjacent areas to leave until restoration is completed.

2.0 Water Damage Restoration Guidelines

Determine the category of water damage

A preliminary determination should be conducted to determine the category.

- Category 1 water damage can be restored without provisions for controlling contamination
- Category 2 or 3 water damage will require remediation steps to control potential contaminants prior to restorative drying procedures.
- Consideration should be given to the original water source but also to the quality of the water after it contacts or passes through various materials.
- Conditions, along with time and temperature, can further degrade water quality and affect the category.

Category 2 and 3 water damage restoration requires the services of professionals such as:

- Restoration firms
- Competent persons
- Qualified environmental consultants

It may be prudent to retain such professionals for large-scale or complex Category 1 water damage situations as well.

Some additional factors to consider:

- Public health concerns
- Type of occupancy (elderly, childcare, immunocompromised individuals)
- Presence of hazardous materials or other contaminants (i.e. pre-existing conditions)
- Indoor air quality concerns
- Level of impact to building operation

Conduct Moisture Evaluation

Conduct an initial moisture evaluation to determine the extent of the water damage, along with the type of materials, assemblies, layers and contents that have been affected. The evaluation should begin at the source of the water damage and trace its path across and beneath various surfaces in all directions.

- Use moisture meters and thermal imaging cameras to assess the extent of water damage
- Establish a dry standard as a reference for acceptable moisture content in building materials that have not been affected by the water damage
- User thermo hygrometers to measuring the relative humidity (in %) in the affected areas
- Map out the extent of moisture and determine the class of water damage
- Closely evaluate building materials that have multiple layers and built-up assemblies or hollow cavities that could trap moisture (i.e., destructive testing)
- Assess porous materials and contents that cannot be salvaged for removal and disposal as needed
- Identify sensitive materials, high value items and confidential documents that may require specialized restoration procedures (i.e. professional freeze drying, and detailed decontamination procedures conducted)
- Record moisture and humidity readings regularly to evaluate the restoration process and to check when the affected area is dry (i.e. daily humidity and moisture records).

Category 1 Water Damage Restoration

Category 1 water damage that is limited to small or localized areas may be performed by the uOttawa Construction/Disaster Restoration/Building Envelope team provided that no pre-existing mould or hazardous material concerns have been identified.

Large Category 1 water damage, (i.e. multiple floors, or requiring significant equipment) should only be handled by qualified restoration contractors.

The bulk of the water should be extracted as soon as possible in order to facilitate the drying process and minimize the amount of time required for evaporation.

Consider these general points when mitigating Category 1 water damage:

1. Respond within the first 24 hours
2. Determine whether other hazardous building materials or conditions are present.
3. Dike and curb bulk water to prevent it from spreading
4. Extract bulk water as soon as possible and repeated as necessary.
5. Conduct a thorough moisture evaluation of the affected building materials.
6. Identify areas where moisture or contamination may be trapped.
7. Raise furnishings and contents above the floor, or protect them in another manner.
8. Erect local containment by installing polyethylene sheeting to control humidity as needed
9. Install dehumidifiers to control humidity
10. Use high velocity air movers to facilitate drying (unless airborne hazards are present)
11. Maintain daily humidity and moisture records

Upon completion of the structural drying process it is important to conduct a final moisture evaluation. This is required to verify that affected materials have been sufficiently dried and that humidity levels have reached a pre-loss condition prior to reinstatement and/or re-occupancy. All records of the work performed should be compiled for the project

Category 2 and 3 Water Damage Restoration

Water damage identified as Category 2 or 3 contains one or more types of contaminants that can result in adverse health effects. These types of water damage conditions should only be handled by qualified restoration companies. An environmental consultant should also be retained to evaluate the damage, ensure that proper engineering controls are in place, and conduct analytical testing as needed.

Personal Protective Equipment: Prior to entering areas that are known or suspected to be contaminated, personnel should be equipped with proper personal protective equipment (PPE) and respirators as required. This may include the following:

- Full-face piece air purifying respirator fitted with P100 filters, or preferably, a tight-fitting positive-pressure full-face piece powered air purifying respirator with high efficiency particulate filters fit tested to the make/model within the past two years, according to CSA Z94.4 requirements.

- Impermeable gloves and full-body dust-impervious coveralls, with attached hoods, tightly secured with tape at the ankles and wrists.

- Disposable boot covers or separate work boots that can be effectively cleaned with a HEPA vacuum or wiped clean prior to removal from the work area.

Engineering controls should be immediately put in place to minimize the spread of contamination. Airborne contaminants can also spread through air circulation and mechanical systems, which requires control measures to be in place.

Consider these general points when mitigating Category 2 and 3 water damage:

- Isolate HVAC and electrical systems in affected areas

- Dike and curb solid and liquid contaminants (i.e. soil, silt, sewage etc.)
- Raise furnishings and contents above the floor, or protect them in another manner.
- Erect polyethylene sheeting to create local or full containment
- Install HEPA filtered negative air units and/or air scrubbers to contain airborne contaminants

Conduct bulk removal of liquid or solid contamination prior to any required demolition or detailed cleaning procedures. Professional extracting equipment or wet/dry HEPA vacuums should be used to minimize the potential for aerosolizing contaminants. Manual removal may also be required if vacuuming or suction devices are not feasible.

Upon completion of bulk removal and extraction, the affected area should be re-evaluated by both the restoration firm and an environmental consultant. The assessment should focus on specific details pertaining to the impacted building materials and contents so that proper restoration techniques can be outlined and implemented such as:

- Identifying other hazardous materials that may be present
- Safe use of biocides and disinfectants to reduce the potential for microbial growth
- Controlling humidity using dehumidifiers
- Identifying areas with trapped moisture or contamination
- Using specialty equipment to control dust during demolition activities (i.e. HEPA dust collection attachment)
- Proper bagging, sealing, and transferring of waste for disposal
- Facilitate drying using high velocity air movers (following cleaning & sanitization)
- Maintain daily humidity/moisture record

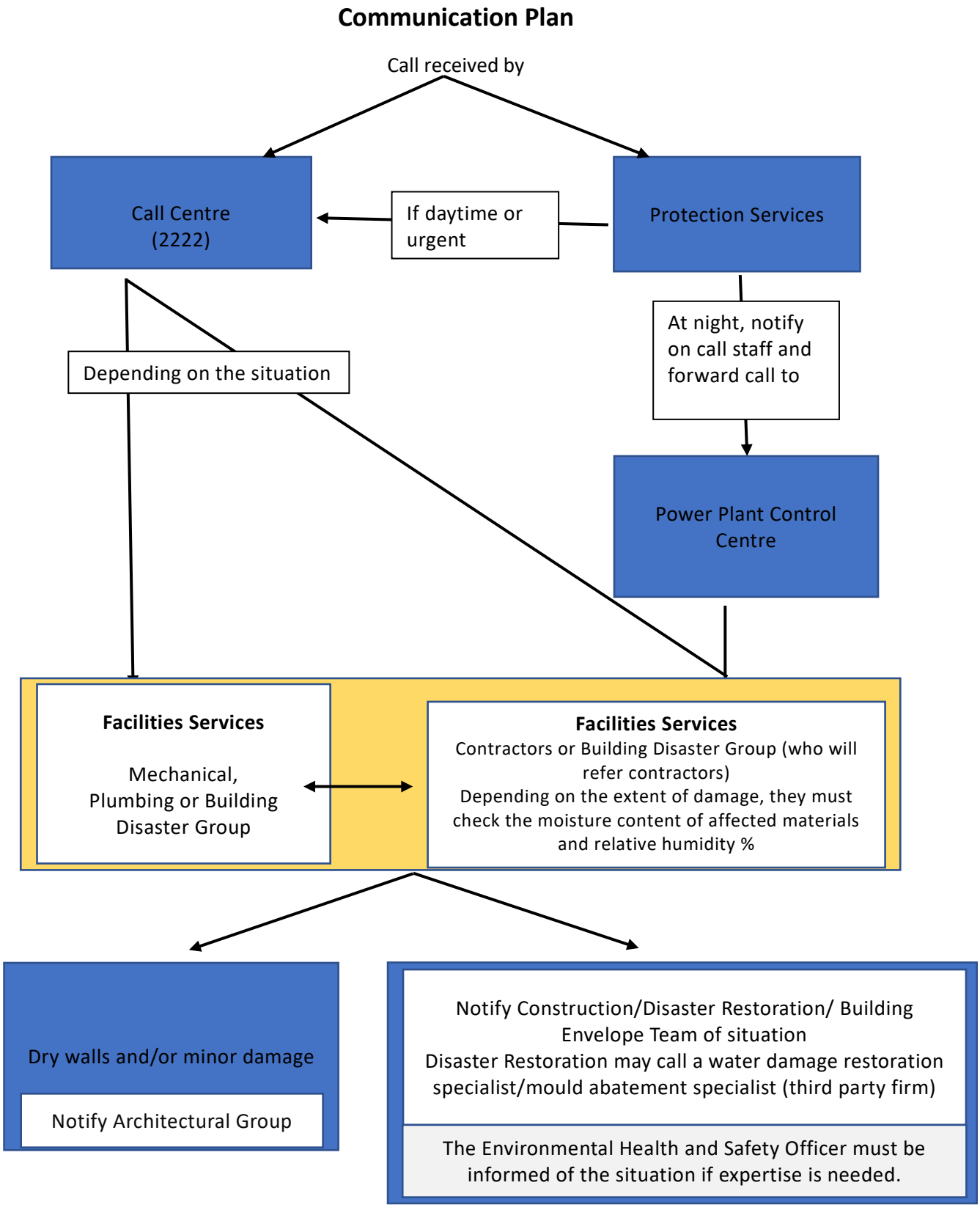
Upon completion of detailed cleaning and disinfection procedures the following must be conducted prior to dismantling the enclosure and removing engineering controls:

- If required, arrange for an Environmental Consultant to conduct any necessary visual inspections
- Ensure the area and contents have been thoroughly decontaminated
- Ensure that waste has been properly disposed of according to municipal/provincial requirements
- Ensure that area/contents have been sanitized and disinfected with an approved biocide.
- Arrange for collection of necessary analytical testing (i.e. mould, bacteria, other parameters)
- Receive written confirmation and laboratory results confirming conditions are acceptable.
- Ensure building materials are sufficiently dried and the % Relative Humidity is acceptable.

Once structural drying is complete, it is important to conduct a final moisture evaluation to verify that all affected materials are sufficiently dry.

The restoration contractor can then be authorized to dismantle any enclosures and demobilize from site. Compile all records of the work performed for the project. You can then make arrangements can to re-instate finishes and contents, and restore building systems to normal operation and occupancy.

Appendix C – Communication Plan



Appendix D - Supervisor Checklist

Université d'Ottawa | University of Ottawa

Immeubles | Facilities

141 Louis-Pasteur

This checklist aims to assist supervisors investigating complaints of indoor air quality in areas under their responsibility; it will help them develop a workspace profile. The information collected by the supervisor, together with information reported by the worker, can help identify a likely cause or rule out unlikely causes of indoor air quality problems. Note that the presence of the materials or situations listed below is not necessarily the cause of a poor indoor air quality problem

This checklist is not exhaustive. Supervisors may need to adapt the checklist to their needs.

Building: Room:

Date:

General workplace observations

☐ Number of occupants
- Is there enough space given the number of occupants?

☐ Use and condition of flooring
- Is there a carpet or is flooring past its useful life?

☐ Recent renovations or construction-related work in the area.
- Has the area been painted, or has new furniture or textiles been recently installed, ?

☐ Odours
- Is there a noticeable odour in the area?

Walls, ceiling, and floors

☐ Evidence of water infiltration
- Are there water spots, stains, recent flooding?

☐ Evidence of mould
- Is mould growth visible, are there musty odours, heavy and stale air?

☐ Dust on horizontal surfaces
- Is dust visible on shelving, desks or other flat surfaces?

☐ General cleanliness
- Do the occupants maintain a well-kept and tidy area?

☐ Operable windows
- Can the occupants operate windows?

Open concept locations

☐ Screen or wall dividers
- Do the dividers allow sufficient airflow (maximum height 1.5 metres)?

Pollutant sources

☐ Photocopiers, printers
- Are they located in low-traffic areas, away from occupant workstations?

☐ Waste collection stations
- Are they located in general use areas, such as hallways?

☐ Chemical or general storage and handling areas
- Are they located in dedicated use areas (such as separate rooms)?

☐ Kitchen, food preparation areas
- Are they located in low-traffic areas, away from occupant workstations?

☐ Other individuals
- Are perfumes or personal hygiene an issue?

Contaminant sources

☐ Parking garages or lots
- Are odours and/or low levels of carbon monoxide present?

☐ Loading zones
- Are odours and/or low levels of carbon monoxide present?

☐ Smoking area
- Are odours and/or low levels of carbon monoxide present?

☐ Combustion equipment (furnace, water heater, etc.)
- Are odours and/or low levels of carbon monoxide present?

Ventilation system (HVAC)

☐ Ventilation system
- Have noticeable alterations to the ventilation system been installed (diffusers, shields, barriers, etc.)?
- Are independent heating or cooling devices present?
- Are diffusers or louvers free from particulate accumulation?

☐ Sufficient fresh air or air exchange
- Is there noticeable air movement in the workspace?

☐ Filtering media
- Are filters (particulate, activated charcoal, etc.) changed when required?

☐ Pollutant source at air intake
- Has a pollutant source been identified at air intake?

☐ Cleanliness of air ducts and plenum (area above suspended ceiling)
- What does a visual inspection of ducting or plenum reveal?

☐ Ventilation schedule
- Does the ventilation system schedule comply with Facilities recommendations?

☐ Other microbial sources
- Are condensate trays (for air conditioning) and cooling coils free of standing water and slime?

☐ Preventative maintenance activity, including last known maintenance activity
- When did Facilities last conduct regular maintenance of the HVAC units for the work area?

Other observations: