

Cleaning Up Your House After a Flood

Flood Problems

This publication provides advice to people who have experienced water damage as a result of plumbing leaks, major spills, flooding, or sewer back-ups. Each of these conditions causes materials to become damp, wet, or saturated, and therefore susceptible to microbial attack from moulds, bacteria, or other organisms. While these microbes can cause structural decay, a more immediate concern is the health of clean-up workers or occupants. Some health effects are severe and could result in hospitalization and permanent health problems - even death. Do not take these risks lightly!

Not all problems with wet materials are alike. Some are more severe than others, either because of the amount of material that has become wet or because of how saturated that material has become. Time is a very important factor. All materials are likely to become mouldy if they are wet enough for long enough. Judge each incident on its own merits, and tailor clean-up procedures to the specific problem at hand.

In this document, the word "flood" is used for any accident that leads to serious wetting of materials, with some possible contamination as well.

Sewage

When sewage, especially including faecal matter or decayed vegetation, is carried by flood water, take special precautions. The risk of infection is very real and the dangers are significant. It is not safe to assume that the air can be breathed or that the water and surfaces can be handled without risk of infection. Treat every bit of material as though it were seriously contaminated. Do not try to save carpets, clothing, and bedding that have been exposed to sewage. Even after surfaces are dry, they may carry live bacteria and cause infection, either through direct contact or when these infectious agents become airborne and are inhaled.

WATER AND MATERIALS CONTAMINATED BY SEWAGE SHOULD NEVER BE HANDLED BY PEOPLE WITH CUTS OR OPEN SORES. THE RISK OF INFECTION IS TOO GREAT!

Contact the local Environmental Health Officer or health department if sewage contamination is suspected. If the Environmental Health Officer requires the use of respiratory filtration, special clothing, etc., follow their advice closely. Health regulations exist to prevent serious health problems that are known to occur under such circumstances. Follow them!

Isolate sewage- contaminated waste materials in clear, heavy-duty bags and tag them immediately. Follow local regulations for disposal so that nobody who is exposed to these materials will be infected because of your carelessness or thoughtlessness.

Mould

Mould will grow on any surface that is wet enough for long enough, unless it is spotlessly clean and has no nutrient value of its own. Few surfaces are that clean, especially after they become wet.

In most cases it takes only a day or so for mould to establish itself on a wet household surface. When flooding has occurred, you may not even get back into your home before a mould problem has started, and the best you can do is clean up after the fact.

Prompt action is desirable. It costs less effort and money to prevent problems than to clean them up.

The secret to preventing a mould problem is to get all wet surfaces clean enough and dry enough within hours.

Rapid disinfection and decontamination will also help prevent problems and give you more time to get materials both clean and dry. Select and use disinfectants carefully as most are toxic to humans as well as to moulds, bacteria, and

viruses. It is unlikely that any chemicals are both safe to humans and generally effective in preventing the growth of these microorganisms.

Other Microbes

Several bacteria found in soil and sewage are dangerous to humans. Wet muck buried within walls can grow very complex colonies of fungi, bacteria, and other microbes that would produce toxins dangerous to our health. They have learned to grow in close ecological communities that support each other, but our health can be seriously affected by their byproducts.

During and after a flood, expect the soil-based bacteria that cause Humidifier Fever, Pontiac Disease, and Legionnaires Disease. Each is known to cause disease under the right conditions. Legionnaires Disease may not be diagnosed until people are very sick, so BE CAREFUL!

Our drinking water is frequently sampled to determine the presence of faecal coliform bacteria, which indicate the presence of other disease-causing agents. Such tests are necessary after a clean-up, to ensure that water in and around our houses is also clean and presents no health risk. If other tests are recommended by health or housing authorities, have them done for your own good and for the good of the community around you. They are a necessary expense, not an option.

PERSONAL PROTECTION

When surfaces are wet and water is being splashed about, you can be exposed to bacteria in the water droplets that reach your face. Once surfaces dry or become dusty, you risk inhaling mould spores and mycelia that fly free when these surfaces are disturbed. To prevent disease or toxicosis, wear a face mask that can prevent inhalation of fine droplets or dust.

There are three different categories of masks available for use during a clean-up, each with its own advantages and disadvantages:

- A comfort mask, such as the 3M #8500 or equivalent, is inexpensive, disposable, and easy to put on, but it seldom fits well enough to give really good protection. A comfort mask is the minimum protection that you should use. It should be changed every few hours, or sooner if it becomes soiled or wet.
- If there is visible misting or dust about, you should wear a half-face dust-mist respirator, such as the 3M #8710 or equivalent. Take care to ensure that it fits well, because leaks prevent good protection. Beards cause problems with fit.
- In very poor conditions, such as when sewers are backed up, a full-face respirator may be recommended by health authorities. These respirators are hot and uncomfortable and may limit the amount of work you can get done, but they may prevent serious infection that could have worse consequences, so wear them for your own protection.

If you want to learn more about masks, CSA standard Z94.4 93, Selection, Use and Care of Respirators, is available for \$55.00 from Canadian Standards Association offices. It provides important information for those using a mask for risky situation or over an extended period of time.

THE IMPORTANCE OF TIME

Under warm, wet, nutrient-rich, food-rich conditions, bacteria require only hours to multiply by hundreds, then thousands. Some moulds start to grow within days of inundation and show luxuriant growth within a week. To help slow their advance, rapid disinfecting, cleaning and drying of surfaces are essential. Give priority to porous surfaces of paper, wood, or organic fabrics.

If possible, remove water within minutes or hours. Water can be drawn above the water line inside many materials, including drywall, insulation, cushions on furniture, wood and paper. Water moves more slowly in dense materials, but

it can eventually soak into all materials. Time is the enemy. Given enough time, bacteria and moulds will thrive.

If materials do not change colour when subjected to a chlorine bleach bath, add chlorine to the remaining water to prevent, or slow, the growth of microbes. take care to ventilate well whenever using chlorine bleach, however, as it is harsh to lungs and skin.

EXAMINING AND DECONTAMINATING THE HOUSE

HOW BAD IS THIS HOUSE

A small, non-sewage spill or leak that is confined to a hard floor surface, such as ceramic tile, concrete, or sheet linoleum or vinyl, will seldom become a dangerous source of organic material before it dries enough to keep moulds and bacteria from growing. At the other end of the spectrum, a flooded basement that takes weeks to dry out is almost certainly cause for concern. In between, plumbing leaks inside walls may cause serious problems if air can leak freely into and out of the cavity, or remain less troublesome if the cavity is reasonably protected from contact with the indoor or outdoor air. Unfortunately, most cavities are not well enough sealed to remain safe, and can cause health problems to occupants.

if mould can be smelled when you enter from outside, or if it is visible, treat it. Please see Clean-Up Procedures for Mould in Housing (NHA 6753). The overriding lesson of that publication is that

PEOPLE SHOULD NOT LIVE IN MOULDY HOUSES.

If standing water is visibly cloudy, or if it or the space smells foul, then it is sufficiently polluted to require urgent treatment and removal. treat and remove it, then clean and dry the materials involved as rapidly as possible.

Clean out mud introduced flood waters as soon as possible, and clean the surfaces of materials promptly. Remember that many microbes react quickly to favourable conditions, and take prompt action. Thorough cleaning and drying are necessary steps, not just good ideas.

HOW CLEAN IS CLEAN ENOUGH?

Even a thin film of organic matter on concrete or ceramic is enough to support the growth of moulds, at least for a short while. On wood, drywall, paper, et., no surface dirt is needed, although growth maybe more rapid and luxuriant if fouling exists. The film that supports moulds may be so thin that it is difficult to see. Therefore, totally clean is the only resistant state.

Absorbent materials, like wood, paper, and drywall, normally hold enough nutrients to support growth and store enough water to allow a significant amount of mould to accumulate. Because it is virtually impossible to get these surfaces clean enough, disinfect and dry them as rapidly as possible, following instructions in later sections.

If left for more than a few hours, standing flood water can be rich enough in nutrients and inoculated enough with bacteria, moulds, amoeba, and other contaminants to grow a rich broth of organic materials. rapidly disinfect such standing water.

AN ACTION PLAN

In deciding what to do and when, follow this list, carrying out actions at the top of the list first.

1. Disinfect water and materials as soon as possible, to prevent further growth of microbes.
2. Clean out mud and other debris.
3. Scrap all materials that cannot be saved, then bag and tag them. Arrange to have them transported to the correct disposal site, according to local regulations. these materials may become toxic.
4. Wash and rinse all fabrics and furniture that will be sent out for cleaning, then dry and ship them to the cleaners as soon as possible.
5. Wash and rinse all surfaces, then disinfect them.
6. Dry all surfaces, then materials, as quickly as possible.

7. Check for contamination, and correct where found.

Disinfection is used at several stages, to kill microbes that could cause rot, infection or injury, or to slow their growth. Clean surfaces as soon and as well as possible, to reduce the number of bacteria, their source of food, and the water they need to grow. Since health is more important than possessions, scrap difficult-to-clean materials. This is necessary, not an option. It may seem to conflict with the need to recycle and reuse materials, but these materials cannot be reused. The problem will not disappear until all materials are too dry to support the growth of moulds. Finally, it is vital to check that the problem has been really solved, since some common health effects of exposure to fungi and bacteria are much too severe to be taken lightly.

Contact your insurance agent as soon as possible, and record the details of damage on film or video-cassette if possible.

SELECTING CLEANING MATERIALS

Select cleaning materials with care. they should be powerful enough to get surfaces and materials clean, but gentle enough not to damage those materials or our lungs and skin. Those requirements sometimes make selection difficult.

Many aggressive all-purpose cleaners dissolve and remove oils and difficult grime by using solvents and strong chemicals that are not good for lungs, skin, or the environment. Use effective cleaning materials that are safer to the environment instead of cleaners that pollute, unless they are the only cleaners available. Remember that time is very important.

Use dishwashing liquid to remove dirt from lightly soiled materials and surfaces. use laundry detergents for general cleaning, but carefully rinse the residues off surfaces after use, as they may cause skin and lung irritation.

use only enough cleaning material to clean well. Using excess soap or detergent is wasteful, and it results in a film on surfaces that fosters soiling in the future. The general rule is to use less than you think is necessary, then increase the amount if cleaning is slow or incomplete. You should quickly come to the correct proportions.

CHEMICAL DECONTAMINATION

Decontaminate in two steps: first, as soon as possible, treat standing water with dilute solutions that do not seriously bleach colours; second, clean all materials brought back indoors, as well as indoor surfaces, at full strength. This second cleaning is best done when the surfaces are clean and water-free but still damp, so that bleach is drawn deep into materials.

Almost all disinfectants that are used for decontamination are toxic, or may ultimately prove to be toxic, to humans. Select and use them with great care, with due allowance for their toxicity and their possible effects on occupants and workers. At present, we can recommend only chlorine bleach as an effective disinfectant for decontaminating surfaces and materials. However, bleach can affect the colours of many surfaces and materials, and destroy organic fabrics such as silk and wool. It can also weaken cotton fabrics to the point where the cloth disintegrates.

Another disinfection solution, 160 proof ethyl alcohol, is also effective. It can kill both bacteria and moulds, but its use is highly restricted. It is also much less effective when diluted.

Several mild compounds may affect some moulds and bacteria. These include vinegar (an acid) and baking soda (a base). Neither is highly efficient but both are safe enough to be ingested. Stronger bases are washing soda and borax, both used as water softeners. However, extensive use of borax may lead to a boron sensitivity, if contacted with skin or airborne particles is not prevented. Trisodium phosphate (TSP) is a very aggressive compound often used to clean concrete or badly soiled paint. Use with great caution and rinse well. None of the common disinfectants are reliable enough to replace chlorine bleach or good enough to outperform vinegar or baking soda.

CHLORINE BLEACH

Chlorine bleach (5% sodium hypochlorite solution in its normal concentration) is an effective disinfectant for most bacteria and fungi (like moulds), but the chlorine gas it releases during use is damaging to lungs, as well as to skin and

other tissues. Use it with care and plenty of cross-ventilation. For full effect, use it full strength and let it remain on surfaces for 15 minutes. This sometimes requires a rewipe when drying takes place rapidly. Wipe with a solution of one part bleach in four parts water to reduce contamination on surfaces that have not been directly involved in the flood.

Chlorine bleach is no longer effective when the chlorine smell disappears. Bleach leaves no residue and no long-term protection. Leaving the building as soon as it is applied and returning only after the smell has gone can reduce exposure but not eliminate it. Do not use chlorine bleach until cross-ventilation is in place, and prevent contact with skin. Rinse quickly and well if accidental contact takes place.

To reduce the rate at which bacteria and moulds grow during a flood, add low concentrations of bleach to the flood waters. However, when water is heavily contaminated, the bleach quickly becomes inactive. It is possible to reapply bleach periodically in those cases, but occupants and workers will continue to breathe the fumes as a result. Reuse will also increase the bleaching effect on susceptible materials.

A final note of obvious caution: bleach will affect the colours of many materials and surface finishes. Use with care! It actually dissolves wool and silk, so do not use it on those fabrics. It also weakens cotton, so limit the exposure of cotton to these solutions.

THE FIRST STEPS

Remove all soaked and dirty materials and debris from the home as soon as possible. This will entail hard work and painful choices, but the longer-term effects of failing to act aggressively may be much worse than taking wet materials outdoors.

Quickly remove wet insulation, residual mud and soil, sodden drywall, clothing, and bedding, and decide how to clean and dispose of cloth materials once they are outside. If all contaminated material is not taken outside as soon as possible, indoor problems will become worse.

Water and debris can get into hidden places much more easily than we can. Furnaces, ducting, appliances, the interiors of walls, and hollow furniture are just some of the places that can hold a hidden mess of contaminated soil. Ceilings of finished basements can carry tonnes of muck and be a safety hazard if they collapse when the materials that support them lose strength.

Equipment exists to suck out fouled water. Your local septic tank cleaning service can clean out a basement full of water more rapidly than you can, even cope with the wash water you use to hose down the dirt that sticks to walls and furnishings. The worst cases may take several trips, but this could be the simplest method. If you are permitted to dump the contaminated water directly into a storm or sanitary sewer, the costs of using such a truck would go down dramatically.

WASHING DOWN

After the worst of the dirt has been removed, remove the thin coating off all surfaces of structures and of possessions that will be saved. Hidden surfaces must also be exposed for cleaning.

Even if you give priority to lower floors where contamination is worse, you should not neglect surfaces in areas far above the apparent water line. When house air has been extremely damp for an extended period, wallpaper, paint, curtains, bedding, clothes, etc., may all be growing mould. Act promptly to get things dry, then clean and disinfect later, if the original efforts were too late to prevent some mould growth. This might be worth many hours and dollars later.

It may seem ludicrous to use water to solve a problem caused by water, but it does make sense if that later bath prevents future problems. Several rinses of already-wet materials will not make them noticeably wetter. The key is to rinse, not soak, and to use some highly diluted disinfectant at the same time. Use a squeegee or damp-then-dry cloth wipe, to remove surface water. That will be very helpful during later drying (where evaporation is both more energy intensive and slower). The more surfaces that look squeaky-clean and water-free, the better.

DRYING THINGS OUT

if wet materials are fouled, they rot, support mould or bacterial growth, and otherwise lead to unpleasantness, often in a short time. Once they are cleaned, they must also be completely dried as soon as possible. There are several ways of accomplishing this, each with advantages and disadvantages.

Drain off water with submersible pumps, pails, mops, squeegees, cloths, etc. This is the most efficient method of rapid water removal. It takes a much longer time and more energy to evaporate water than it does to move it out as liquid. This should always be the first step.

Use natural ventilation if it is adequate. It requires little outside energy, but it can be very slow, especially in damp or muggy weather. Moreover, all spaces and materials may not be equally well ventilated. When the outside temperature is close to freezing, it is better to add heat while ventilating. This will both increase the rate of drying and make the indoor environment more comfortable for occupants or workers.

Use mechanical fans to speed up drying when the outdoor air is dry and not too cold. When it is cold outside, use fans along with heaters. Use circulation fans indoors as well, to ensure full mixing of the air and more rapid evaporation from surfaces.

A dehumidifier can change water in the air to liquid and help dry out wet surfaces. it uses less electrical energy than heaters for the same drying effect. Some chemical dehumidifiers use no electrical energy, but could cause pollution if the wet salts are carelessly disposed of. use a dehumidifier when electricity is available but limited. You will get more drying for each scarce watt of electrical power with a dehumidifier.

Selecting a wet-dry vacuum

If electricity is available, use a wet-dry shop or industrial vacuum cleaner to rapidly speed the removal of water as well as soil and other loose contamination. After rinsing, a wet-dry vacuum gets more water off surfaces and out of materials than any other pre-drying method.

Use a shop vacuum for small jobs, since it can do the job quite well and quickly prepare surfaces for air drying.

Industrial vacuums, available from many tool rental companies, are bigger and more powerful, and are usually better suited to the messy conditions following a spill or flood. They may also come with useful attachments that provide better access to crevices and hard-to-get-at places. Because of their power and ruggedness, they often get big jobs done much sooner. You can improve your chance of success if you use an industrial unit. If you have a shop vacuum, use it until you can get an industrial unit to supplement it, then use both.

Remember, of course, to treat the contents of the shop or industrial vacuum, as well as all tools and hoses, as contaminated material, and never return these machines to their owners until you have thoroughly cleaned them.

To ventilate or to dehumidify?

Once the water has been removed, select a method that will rapidly and completely dry all materials. Sometimes the best choice is ventilation, assisted by heating. Under other circumstances, dehumidification is a better choice. Sometimes there is little advantage either way, or only one set of equipment is available. Then just get on with the job.

Dehumidifiers are an energy-efficient method of removing water vapour from the air and supplying warmed air back to the space. Most return several times more heat to the air than is available from an electrical heater drawing the same power, so they can dry faster when there is limited electrical power available and oil or propane heaters are not available. Large specialty units can sometimes be rented; if they are available, they are a good choice. They can even be used to advantage when small amounts of dry heat are available from other sources, since the amount of water they remove each day increases as the indoor air temperature increases. they do not work well in cold spaces, since their removal rate drops very rapidly below 20°C.

Ventilation equipment can also remove large quantities of moisture if used with a heat source that does not introduce combustion water into the indoor air. The important point is to generate rapid air flow within each space and to remove enough air to get the evaporated water outdoors as quickly as possible. If it is damp or muggy outside (as is often the case after a flood), the air coming indoors is already loaded with water vapour and it must be heated before it can move much water. If it is left indoors, it can damage many indoor materials and furnishings. Avoid temperatures over 35°C, since higher temperatures can distort wood furniture and trim.

Selecting a dehumidifier

In choosing a dehumidifier, try to get a large unit, or even several large units for serious cases, and look for a unit that can work at the indoor air temperature that you can provide and maintain.

Dehumidifiers are rated at a liquid removal rate, expressed as litres or gallons per day is equivalent to 45 litres per day. This rating is for some typical indoor temperature (about 23°C), which is often not stated, and may differ for different manufacturers. It is very important to note that the dehumidification rate drops rapidly if the indoor temperature is lower than the rating temperature, and it climbs even more rapidly at higher temperatures. If supplemental heat is not provided, use a unit with an automatic defrost! Those without an automatic defrost cycle will stop removing water altogether when the air temperature drops below about 15°C.

If the unit you choose does not have a powerful circulation blower, then provide one, so that the air in the space is well mixed and the air velocities next to wet surfaces are high enough to move the moisture away from the surface and toward the dehumidifier. Almost all units require this extra air movement, especially when additional heating is not provided.

What type of heater to use

Selecting a heater can be quite easy when only one type is available or when the electrical power is out. Otherwise, the choice can be more difficult because there are so many types available. Some units help remove moisture much faster than others, however, so the correct choice will reduce drying time, sometimes substantially.

Because electric heaters are often more readily available than other types, they can be a good choice if you have power. When power is limited, only small, less effective units can be used. In this case, run a small heater and a large dehumidifier, which also provides heat.

Combustion heaters (oil, propane, or natural gas) produce water vapour when they burn fuel. They add moisture to the indoor air if they are not vented directly outdoors. Only more sophisticated units, which need electrical power as well as fuel, have direct vents. Vented heaters are especially effective when used with a dehumidifier; but, if you cannot dehumidify as you heat, vented heaters are much more effective than the unvented ones.

If no electrical power is available, use unvented heaters, but set and reset the amount of ventilation to the outdoors to maintain the indoor temperature between 25°C and 35°C, so that drying is rapid but does not cause further damage to indoor materials.

USE ALL HEATING DEVICES WITH CARE! SURFACES CAN GET HOT, LEADING TO FIRES, OR ELECTRICAL COMPONENTS CAN SHORT OUT, CAUSING A SHOCK HAZARD.

CLEANING THE HOUSE

FLOORS

Floors often get more badly soiled than other surfaces. To prepare for cleaning, move furniture and all removable floor coverings outdoors. It is very important to move wet carpets and other sponge-like materials off floors as soon as possible, so that the floor does not start to distort or delaminate. This unnecessary damage will dramatically increase repair costs. These items will be very heavy. Save your back by dragging them on a plastic sheet instead of carrying them.

Quickly clean board, particleboard, or plywood floors, then disinfect and dry them. Pay special attention to cleaning and

drying cracks, where dirt may hide from earlier attempts at removing muck.

Sheet floor coverings, such as vinyl, linoleum, or other materials, pose specific questions: Have they protected the underfloor from dirt and soaking? Have they lifted somewhat and created pockets of dirt and water? Will they prevent rapid drying?

If dirt and water have been kept out of all but a few locations, treat only those local areas. If the floor coverings are trapping dirt and water, remove them. They may have to be scrapped. If they have not prevented severe wetting of the wooden subfloor, remove them to allow rapid drying. Treat each case as unique, and examine the situation carefully before you decide on a course of action. Sometimes wet floors can successfully dry downwards toward a removed or missing ceiling below, but they are quite likely to buckle when dried that way. Fixing a buckled floor will be more trouble and expense than scrapping floor tiles or sheet flooring.

Remove tile flooring unless you are certain that no water has gone through. Most often, tiles do not prevent soiling but do get in the way of cleaning and retard drying.

CARPETS

You cannot successfully clean flooded carpets without professional help. Ship them to a cleaner who has experience with wet carpets. It is important to remove all carpets to the outdoors as soon as furniture is out of the way and most muck has been removed. If they are to be salvaged, wet-clean and rinse them again. Dry cheap carpets rapidly to the point where they can be removed, if that is possible.

Carpet underpads cannot be saved and must be removed and discarded. They will be very heavy to move and will likely disintegrate during removal. remove all of the bits that remain, as they store water, dirt and microbes.

Only very expensive carpets are worth saving when they have been contaminated with soil or sewage. carefully rough-clean rare and expensive carpets and throw rugs, then move them outdoors and rinse them several times from both sides. contact an appropriate cleaning company and ask about subsequent steps. The cleaner may request that only simple measures be used for preliminary drying, to reduce shrinkage and fading. Wrapping the carpets in heavy plastic or bags is usually required and rapid transport is vital, as this is a race against deterioration from dirt and microbes as well as water damage.

WALLS

Clean walls above the flood line as possible, to prevent the growth of microbes that could cause health problems to workers or occupants. Break out walls that have been soaked or that have absorbed water up from the flood line, so that interior cavities may be cleaned. replace surfaces afterward. Do not just clean the surfaces!

In a major flood, wash walls that are not soaked, using both a detergent and some chlorine bleach. To prevent lap marks, move from the floor upward and ensure an overlap of cleaning. Clean all walls in a flooded house, even those that are on floors above the water line, since they will have been exposed to excessive humidity for long enough to start mould growth. This growth is often difficult to see without special instruments and techniques. Don't assume that surfaces are all right because they are often one floor above the obvious problem zone.

If only the floor has been flooded, and only for minutes, then the above steps are unnecessary. However, you may have to remove baseboards and mouldings to check for trapped dirt and water.

INSIDE WALLS AND FLOOR CAVITIES

When flooding backs water into the insides of walls and the cavities between ceilings and floors, hidden materials usually become waterlogged and contaminated with dirt or other organic materials. If these cavities are not opened, then cleaned and thoroughly dried, bacterial and mould contamination may become severe, leading to serious health problems for occupants. Too often, such contaminated cavities are left closed.

Whenever there is the suspicion that a cavity has become wet, probe or open it to find out whether materials are wet. Soon after the main flood water is removed, use small holes near the bottom of cavities to allow drainage from within. Later, use moisture probes or check drillings for dampness. Whenever wet material is found in these cavities, open them to allow cleaning and drying.

Once walls are opened, or ceilings are torn down for access to the underfloor area, empty the cavity of any insulation, debris, or dirt, and dry all interior materials. If wood structural members have become saturated, it may take days or weeks for them to dry completely, before the cavity can be closed again. The more quickly hidden spaces are opened, the less water saturation will take place and the quicker materials can be dried to safe levels.

WET INSULATION

Fibrous insulation materials (such as glass fibre, mineral wool, and cellulose) pick up surface contamination even without being wetted in a flood. During flooding, their vast surfaces can pick up large amounts of contamination and trap it during draining. If they stay wet for extended periods of time, moulds and other microbes can grow. They also lose their insulation capabilities, even after drying, so replace them.

Board insulation, such as styrofoam and urethane, can also become saturated, although urethane and extruded styrofoam become saturated more slowly than beadboard-type styrofoam. To be safe, remove and replace these materials unless it can be shown that they are not trapping water or dirt.

Given enough time, all of those insulation material will wick water up above the high-water mark. That rising damp region can reach half a metre (1 to 2 feet) in a few days under some conditions. For that reason, remove the insulation above the obvious high-water mark and replace it with new material once the cavity materials dry sufficiently.

Clean and dry cavities to the same standards that you use for other surfaces and materials, or better. Otherwise, once cavities are closed again, developing problems will remain unseen and unchecked until they have become severe.

CEILINGS

Ceilings above the high-water mark may be reasonably dry and undamaged, but they still require checking and cleaning. Because water can wick up walls and around corners into ceiling materials, check the condition of drywall and plaster to ensure that the cores of these materials are not saturated beneath the surface. If they are, replace them.

Carefully clean ceilings that are only surface damp, to ensure that a thin film of mould did not grow when the air was very wet or muggy. Good spring-cleaning practices should suffice if chlorine bleach is added to the water. Dry rapidly, of course.

APPLIANCES AND ELECTRICAL EQUIPMENT

Do not venture into a flooded basement until the electrical utility has shut off the power to your house at the utility pole or substation. Do not attempt to have house power reconnected until the utility inspects your house and declares it safe.

Do not use flooded appliances and other electrical equipment (such as outlets and switch boxes or fuses/breaker panels) until they have been inspected and passed by the electrical utility or an electrician approved by the utility. They are not safe when they are wet and dirty! Wet dirt is an excellent conductor of electricity and could either short out the power or leave some surfaces electrically "live" and dangerous to touch.

Once small appliances have been rinsed, send them to a repair shop. Be sure to tag these items and tell the repair shop that they have been flooded. If sewage has been involved, it may not make sense to attempt cleaning and repair, because of the risk to repair staff. Old equipment may cost more to repair than it is worth, so do not waste good money on it. Get an estimate first!

Once the power is off, wash and rinse electrical outlet and switch boxes. Be VERY sure the power is off, and be sure that all electrical supply materials and equipment are perfectly clean and dry before power is turned on again. Remember

that wet floors conduct electricity well, so be extra careful! Electricity can kill.

If they were in any way submerged, do not use larger appliances (washing machines, driers, dishwashers, etc.) until they are repaired. Water and dirt in motors and switches can cause severe damage and electrical shock. Get these appliances overhauled before use, and be sure to tell the repair shop about any known or suspected contamination. Give priority to the washer and drier, since you could then use them to salvage clothes, but only if a day or two turnaround time is possible. otherwise, find another way to clean and dry your clothing.

FURNACES AND WATER HEATERS

You will need heat, but not hot water, as soon as you can get it. Don't use flooded furnaces and water heaters until they have been serviced and certified safe by a trained repair person. take no shortcuts.

Have the furnace blower motor replaced, as well as all switches and controls (and there are several of them inside a typical furnace). sometimes, to get heat going in short order, the service person will replace your appliance with an overhauled one of a similar rating. This is normally a good practice, since you need heat to dry things out in all but the hottest of weather. Water evaporation will cool the indoors by several degrees, and ventilation can cool it by much more during most of the year. After it has been serviced, check to ensure that the inside of the furnace case is as clean and dry as the other surfaces in your house. These surfaces are indoors too. replace the furnace filter often over the next few days and weeks, and use a better one than the cheap and ineffective glass fibre filter that comes as standard.

Water heaters are insulated with glass fibre, which can become soggy and saturated under its cover if flooded. Do not allow a service person to leave it to dry out. The insulation may well dry, but it could be badly contaminated with whatever was in the flood waters, and you don't need that indoors forever.

Do not use hot water on most materials, since hot water sets stains from many contaminants (including clays) in flood water. Cold will do just fine, although barely-warm water will aid drying slightly.

LIGHTS, FIXTURES, AND WIRING

Light fixtures and sockets left dirty after a flooding sometimes cause shocks and equipment damage. It is amazing just how small a space dirt can get into and how long it can stay wet when almost closed off from the drying effect of room air.

Once the power is off, or after you have disconnected your lamps, take them apart and check for dirt and wetness. Do the same with your ceiling fixtures after you have taken them down. Clean and dry thoroughly before use. Expect some burnt-out bulbs and cracked or broken bulb glass. Some apparently good bulbs will shatter the first time they are turned on, so get a shade between you and the bulb for the first trial.

Connections in wiring of lights and small appliances can be wet and soggy even after the cover tape looks dry. Be sure they are dry! Don't just hope they are.

DUCTING AND PLUMBING

The forced-air heating ducts in most houses routinely become dirty. Once they have been flooded, they are wet as well. Have them carefully cleaned out, then inspected. This is no time to guess that the vents are really clean. Check and be sure.

Ducts are much cleaner after they are taken apart, then reassembled. than if they are cleaned with a vacuum hose. Choose a contractor who can do the job properly. **Ducts that become wet during a flood should be left shiny-clean!**

Return-duct pans that are nailed to the bottom of floor joists are not very airtight in the first place and will be less so after the joists have been wetted and dried again. Have them taken down and reinstalled after cleaning. This time, make sure that they are installed with crimps and a sealing gasket that will keep them tight and less noisy during operation. Take the opportunity to have leaks from the ducting to the outdoors, as well as to the indoors, sealed. This will reduce future

heating costs and usually improve comfort.

During a flood, the water pressure in plumbing pipes can reverse, and water in hot and cold pipes may be contaminated with flood water. Do not trust your water system to be clean until you have had a plumber introduce bleach into the lines to disinfect them. Normal use of water afterward should keep the pipes clean and well flushed.

FLOOR AND FOOTING DRAINS

During a flood, water may well up through floor drains and sump holes, bringing materials into the house that should never be there. As the water subsides, indoor materials may be sucked or washed into drainage systems and partly block them or just sit there and rot. For health reasons, carefully flush and disinfect floor drains and sump pits. Some physical scrubbing may be needed to get greasy dirt and grime off surfaces that can release pollutants into the indoor air.

This is also the time to check for priming of the floor drains. Install some method to ensure that water stays in these drains, so that sewer gases cannot move up into the house when the drains dry out. If you do not have a flush line installed, be sure to check the drains regularly, pouring some water and chlorine bleach into them to keep them primed and disinfected.

The footing drains outside your foundations may have seen more water and dirt than they could cope with during the flood. Have them checked out by a person trained in plumbing and drains. They can often be cleaned out through special clean-out pipes, or from the connection to the storm sewer. If they cannot, you should be ready for problems in the spring or very rainy periods, when they will not drain as well as they should. Keep stored materials away from basement walls and off basement floors. This will reduce future damage, but remain alert for problems.

WHAT TO DISCARD AND WHAT TO SAVE

Many materials cannot be reasonably cleaned and dried once they have been soaked. It may be impossible to get plush furniture, magazines and books, beds and fluffy bedding (such as duvets and comforters) thoroughly clean. It will usually take days to get them dry, even in optimum conditions. Conditions for drying may not be very good just after a flood, when the air is saturated and cold, or when electrical power and heating fuel are scarce.

Immediately discard inexpensive possessions that have been soaked. Don't waste time on them when there so many other important things to do. Cheap particleboard furniture will likely be unusable after drying, so make no effort to save it. Use your energy to save antique or solid wood furniture instead. Save only very expensive throw carpets. Get regular broom and underpad out the door as soon as possible. With them may go piles of dirt and thousands of litres of water, so that cleaning and drying become much easier. To save your back, slide or drag heavy items, don't lift them!

Dispose of wet glass fibre, mineral wool, and cellulose fibre insulation as soon as possible. Such materials will never be good insulation again, even once dried. They may also support extensive mould growth for years and cause serious health problems.

Finally, do not attempt to save any electrical equipment that has been inundated and water-filled. Some companies can overhaul motors and other expensive electrical equipment, but that is not a home project.

FURNITURE

Furniture may be difficult or almost impossible to clean if it is upholstered or if sewage and other organic materials are involved. Antiques may warrant the expensive treatment that is required to remove organic debris, including sewage. other upholstered furniture does not. Be sure to advise the restorers if sewage is involved. Act rapidly and follow their instructions precisely.

Furniture made of particleboard is unlikely to warrant the work and expense required to bring it back to full service unless the dunking was short and no swelling is apparent. In that case, rinse well, disinfect and then dry rapidly, but not in the sun or with direct heat. Both can cause warping. Watch carefully and slow down the drying process (by temporarily covering furniture) if distress shows on surfaces or warping starts. Open drawers to speed drying, but do not fully

disassemble them, because of possible distortion.

Clean, disinfect, and rinse good-quality wood furniture, then place it where it can get good ventilation, away from the sun and direct heat. Again, leave drawers or other movable parts open but in place, and slow the drying process at the first sign of warping or distress to the surface finish. If necessary, apply surface waxes to slow drying of outside surfaces, and allow inside ones to catch up. professional care may be warranted for better-quality items. Decide quickly.

BEDS AND BEDDING

Do not save mattresses and box springs. They are too difficult to clean, disinfect, dry before a mould problem occurs. Very expensive units can sometimes be rebuilt, since only the frames are saved. Check costs carefully.

Partly dry, shake clean, and wash bedding several times in cold water that contains a small amount of chlorine bleach. Then rinse and carefully dry, to avoid stretching fabrics out of shape. Air drying in a power drier may be the best way to minimize damage. If no power exists, carefully remove most water by pressing fragile items and wringing more robust fabrics. Hang over several lines to distribute the weight of the wet item over several supports. This should reduce stretching.

Pillows cannot be safely cleaned and dried. Although some authorities recommend special cleaning techniques, the risks of having mouldy materials on or near our beds remain. Scrap flood-damaged pillows! They almost surely harbour dangerous bacteria or moulds.

Speed is of the essence with bedding. If it is not possible to start cleaning within hours of water damage, use a weak bleach solution to slow the growth of bacteria and moulds until washing can be attempted. It is better to lose some colour than to risk heavy contamination because of delay.

CLOTHES AND OTHER FABRICS

When contaminated, silks and woolens can be cleaned only by experts. Some decorative cottons are also at risk, since they may not survive treatment with chlorine bleach without excessive fabric damage. Send these materials to a professional right away. Ask for an estimate before agreeing to a massive cleaning bill. Warn the cleaners if sewage has been involved.

Dry clean non-washable clothes that were above the high-water line, if they are otherwise serviceable. This should remove smells.

Scrape off heavy dirt and thoroughly rinse washable clothes as soon as possible, then wash them several times in cold water treated with a small amount of chlorine bleach. After rinsing, dry these clothes as rapidly as you can without risking shrinkage. Do not use much heat at any time - only as much as is needed for rapid drying.

Many well-worn clothes may not warrant the time and effort required for adequate cleaning, disinfecting, and drying. They should be discarded, or at least left until more valuable items have been salvaged. if necessary, keep them in a lightly bleach treated water until you can get to them.

Store cleaned clothes in an area that has been carefully wiped with chlorine bleach and well dried. This space should not be open to mould spores from uncleaned spaces in your house.

PAPER AND PAPER GOODS

Most paper items that have been saturated by flood waters are not worth the time, energy, and effort needed to save them. first, identify valuable materials and treat them. Then focus on items that are less wet and worth saving. Finally, get to the soaked items of lesser value.

At the same time that you want to expose paper to drying processes, you also wish to keep it pressed, to prevent wrinkling. Obviously, you cannot do both. First, get the worst of the water out of the paper. Begin with blank paper or

thin blotting materials between sheets. Some recommend using a light sprinkle of baking soda to help change surface chemistry and deter mould growth. However, any such chemical makes it possible that the inks will be affected, and that the chemistry of the paper will change. test a spot to see if there are any dramatic effects before you use a chemical generally on your valuable paper goods.

Opening books to the breeze and the sun may speed drying. Remember to close and press them at night, or more often if wrinkling starts to appear. Too rapid drying may be hard on bindings, so be cautious about drying them in full sun. Getting paper dry quickly is important, but so is preventing damage.

Paper that is kept together wet for days may weld into a solid mass and become unsalvageable. Act quickly.

FREEZE DRYING

If you cannot take much time for wet paper goods in the first day or so, wrap and freeze them until you can get to them. Rinse off as much of the dirt as possible and towel dry by blotting, not rubbing. If sewage was involved, wrap materials carefully in freezer bags and clean off the outside of the bags before freezing. Because of the high risk of contamination, never mix these bags with food bags.

When a freezer can be used only for wet papers, it may be best to leave items unwrapped or lightly wrapped, as they will dry slightly during storage. This technique is used, in combination with a vacuum, to remove water from extremely valuable documents.

Later, remove items one or two at a time and carefully thaw and dry. Again, a balance will have to be found between too rapid and too slow drying. If paper is dried too slowly, mould will grow; if too rapidly, bindings may distort and pages wrinkle.

After the task is over, clean and disinfect all surfaces, especially those that will come in contact with food. All surfaces should be considered contaminated until they have been thoroughly cleaned and disinfected, then dried.

LEGAL DOCUMENTS AND OTHER VALUABLE PAPERS

Some of your documents are valuable for legal or financial reasons. Others have important sentimental value. If they cannot be saved without some damage, all is not lost.

Make every attempt to clean and dry them as instructed previously. Saving documents through such efforts will be less costly than paying to replace them. Once it becomes clear that mould damage has occurred, or that distortion is going to be severe, focus on saving the information, not the paper.

Some documents can be preserved if true copies are notarized. the damaged originals can then be destroyed and the certified copies preserved. Check with a lawyer to determine which documents can be preserved this way.

Other documents, such as birth records, passports, and other government certificate-type documents, can be replaced, and the damaged versions destroyed. Check with local government offices to ascertain which documents can be replaced this way.

Certain large documents can be substantially preserved if pressed through hot rollers at a copy house that makes blueprints. This could be worthwhile for maps or other large documents that are worth keeping for sentimental or historical reasons. the cost may not be as high as you thought, but the paper will have to be roll pressed before it has dried, so act quickly.