NOTE: This publication was last revised in 2008. For more current information, please refer to the Government of Canada's Get Prepared Web site: http://www.getprepared.gc.ca/cnt/hzd/flds-ftr-eng.aspx

# CLEANING UP YOUR HOUSE AFTER A FLOOD

Canada

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HOME TO CANADIANS

## CMHC—HOME TO CANADIANS

Canada Mortgage and Housing Corporation (CMHC) has been Canada's national housing agency for more than 60 years.

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# CLEANING UP YOUR HOUSE AFTER A FLOOD

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**Disclaimer**

Research into the problems produced by flooding and inadequate clean-up is in its early stages. This document provides the best information available at this time.

Neither the authors nor Canada Mortgage and Housing Corporation intend any of the suggestions in this publication as medical advice. For specific health advice on possible and suspected problems from exposure to flooded housing, consult a medical specialist with current expertise in this area.

For serious house problems, consult a suitably trained renovator or professional who specializes in flood clean-up and has been recently retrained. Knowledge is changing rapidly. The Corporation assumes no liability for any damage, injury, or expense that may be incurred as a result of the use of this publication.

# CONTENTS

# QUICK START

| Step | Action |
|---|---|
| **1** | Contact your insurance agent as soon as possible. If your insurance policy covers flood damage, record the damage on film, videotape or DVD. Find out if your policy includes clean-up costs and if your insurance company will arrange with a contractor to do the clean up. |
| **2** | If your insurance policy does not cover flooding, start the clean up yourself by pumping out standing water. Make sure that your utilities—electricity and gas—are disconnected and the flooded area is safe before entering it. |
| **3** | Hose down affected surfaces with water to remove as much debris as possible. |
| **4** | Remove items and furnishings from the flooded area. Scrap difficult-to-clean materials. |
| **5** | Remove and discard wetted building materials. |
| **6** | Continue hosing down, spraying a detergent solution on soiled surfaces to make removal easier. Use stiff brushes or scrubbers to loosen debris from surfaces. |
| **7** | Rinse thoroughly with water. |
| **8** | If there is sewage contamination, repeat scrubbing with detergent and water and rinse again. Use trisodium phosplate (TSP) to clean stubborn stains on concrete surfaces.<br>**Caution:** TSP is corrosive. Do not allow it to contact skin and eyes. |
| **9** | Continue pumping until all water is drained. |
| **10** | Dry all surfaces as quickly as possible. |

# GLOSSARY

**Bacteria** Microscopic, single-celled organisms that can cause health effects on people.

**Biocides** Chemical or physical agents that kill or inactivate micro-organisms.

**Dehumidifier** A device that removes humidity from the air in an enclosed inside space.

**Disinfectant** A chemical liquid that destroys germs, including mold.

**Drywall** A sheet of gypsum covered by paper. Drywall is used to finish interior walls.

**Fecal** Pertaining to solid body waste.

**Fungi** Micro-organisms that dissolve nutrients from the materials they live on and damage the host materials. Molds, yeasts and mushrooms belong to the kingdom of fungi.

**Fungicides** A type of biocide that inactivates fungi or fungal spores.

**HEPA filter** **H**igh-**E**fficiency **P**articulate **A**ir filter, used in air purifiers and high-end vacuum cleaners to trap the tiny particles in the air.

**Hygrometer** Device used to measure humidity in the air.

**Microbes** A microscopic organism. In *Cleaning up your house after a flood*, a fungus, bacteria or mold spore.

**Moisture probes** Sensors or meters to measure moisture content of wood (available at suppliers of woodworking tools).

| | |
|---|---|
| **Mold** | A fungus that grows on or in damp organic materials. |
| **N95 respirator** | A simple and disposable mask that can remove 95 per cent of particles that are 0.3 microns (a micron is one-millionth of a metre) or larger. |
| **P100 filters** | Highly efficient, oil-proof particulate filters used with half-face or full-face respirators. |
| **Relative humidity** | The ratio of water vapour in the air to the quantity of vapour that would be present if the air were fully saturated. |
| **Spores** | The reproductive cells of fungi. |

# FLOOD PROBLEMS

A flood is any event that seriously wets materials. *Cleaning up your house after a flood* will help you repair water damage caused to your home and its contents by plumbing leaks, major spills, flooding or sewer back-ups.

Your basement is the part of the house that is most vulnerable to flooding. *Cleaning up your house after a flood* starts with cleaning flooded basements and then moves on to the rest of the house.

Leaks, spills, floods and backups cause materials to become damp, wet or saturated and open them to attack from microbes, such as molds, bacteria or other organisms. Microbes can cause structural decay. More important, they can threaten the health of the people cleaning up or the occupants of the flooded house. There can be serious health effects.

Not all problems with wet materials are alike. Some are more severe than others, depending on the nature and the amount of material that has become wet and how saturated that material has become.

Time is very important. All materials are likely to become moldy if they are not dried quickly.

## SEWAGE—CONTAMINATED WATER

Before you start the clean up, it is important to determine if the flood involves relatively clean water or sewage-contaminated water.

You must take special precautions if your house is flooded with sewage. There is a very real and significant danger of infection from breathing the air in an area contaminated by sewage and from handling water and materials contaminated by sewage.

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 their surfaces are dry, they can carry bacteria that can cause infection from breathing airborne particles or through direct physical contact.

> ***People with cuts or open sores, people with respiratory problems and pregnant women should never handle water and materials contaminated by sewage.***

Contact your local health department if you suspect sewage contamination. Follow your health department's advice carefully.

Put sewage-contaminated waste in heavy-duty bags and tag the bags as sewage waste immediately. Follow local regulations for disposal.

## MOLDS

Molds grow on surfaces that are not dried quickly. For most household surfaces, it takes one or two days for mold to start growing. By the time you get back into your house after a flood, mold may have already started growing. The best you can do is clean up.

The secret to preventing mold problems is to clean and dry all wet surfaces as quickly as possible—within hours of the flooding.

## CONTAMINATION OF WATER SUPPLY

Drinking water is tested to ensure that it does not contain fecal coliform bacteria. The same tests are necessary after a clean up, to ensure that water in and around a house is clean and not a health danger. Follow the advice of your health authority.

# THE IMPORTANCE OF TIME

***There is one, all-important piece of advice: Act quickly.***

In warm, wet, nutrient-rich, food-rich conditions, bacteria need only hours to multiply by hundreds, then thousands. Some molds start to grow within days of flooding and show luxuriant growth within a week. Rapid cleaning and drying are essential to slow their growth.

If possible, remove water within minutes or hours. Many materials, such as drywall, insulation, furniture cushions, wood and paper, can draw water above the high-water mark of the flooding. Water moves more slowly in dense materials, but it can eventually soak up into all materials. Time is the enemy.

## SAFETY AND PERSONAL PROTECTION

Make sure that your utilities—electricity and gas—are disconnected and the flooded area is safe before entering a flooded area.

> ***You need high rubber boots and long rubber gloves. You should wear a respirator, especially if the water is contaminated with sewage or mold is growing.***

A respirator protects you from inhaling fine droplets of water or dust that may contain bacteria. There are three different types of respirators, each with its own advantages and disadvantages:

1. A N95 respirator is the minimum protection that you should use. It is disposable and should be changed every few hours or sooner if it becomes soiled or wet. Respirators with a N95 rating remove 95 per cent of particles 0.3 microns or larger. Ordinary masks screen large particles but may not be effective in removing finer particles.
2. If you can see mist or dust, wear a half-face, dust-mist respirator equipped with a P100 filter. For maximum protection, ask your safety supply store to ensure that your respirator fits well. Beards cause problems with fit.
3. In very poor conditions, such as a sewer backup, health authorities may recommend a full-face respirator. They are hot and uncomfortable and may limit the amount of work you can do, but they may prevent serious infection that could have worse consequences, so wear them for your own protection.

The Canadian Standards Association (CSA) publishes standards for respirators. *CSA Z94.4-02, Selection, Use and Care of Respirators*, is available by contacting CSA Standard Sales at

sales@csa.ca
or
by calling toll-free 1 800 463-6727
or
by going to the CSA website at
**www.csa.ca**

*Selection, Use and Care of Respirators* has important information about using a respirator in risky situations or for lengthy periods.

# EXAMINING THE HOUSE

The following questions will assist you in determining how to proceed:

**1. How much water is in the basement?**

Is the water a few inches, a foot or up to the ceiling? It may be possible to drain a small amount of water manually but a large amount of water requires a professional to drain it. If the ceiling got wet, watch that it does not collapse on you.

**2. Is the flood water contaminated with sewage?**

Sewage—contaminated water—requires much more careful and thorough cleaning than uncontaminated flood water. Materials and appliances soaked by contaminated water may need to be thrown out. If standing water is cloudy or smells foul, assume that bacteria have grown and deal with it as if it is contaminated water. If the flooding brings mud into your house, you must rinse your house thoroughly to remove it.

**3. Has mold started to grow?**

Failure to act quickly and remove flood water results in mold growth. If you can smell mold when you enter your house or if you can see mold in your house, your cleaning must include removing the mold. *Clean-up procedures for mold in houses*, published by CMHC, tells you how to clean up mold.

# TAKING ACTION

## FIRST STEPS

### Insurance

Contact your insurance agent as soon as possible. Your insurance policy may pay the clean-up costs and your insurance company may even choose a contractor to do the work.

Photograph, film or videotape the damage as soon as you can safely enter the flooded part of your house. Do this even if your insurance policy covers all costs—the insurance company may want a record of the damage. If your insurance company does not pay for flood damage, you will need a record of the damage if you decide to take legal action.

### Get rid of the water

The first and most important job after a flood is getting rid of the water. Prompt action is of greatest importance, whether you have insurance coverage or not. Find contractors who specialize in removing water in the business pages of your telephone book, under "flood damage restoration" or "water damage restoration."

Contractors and septic tank cleaning services have the equipment to draw water out of your house more rapidly than you can. They can deal with the water and hose down dirt that sticks to floors, walls and furnishings. You may need them more than once—first to remove the flood water and again when you do a more thorough cleaning.

Small amounts of water can be removed manually using pails or buckets—an option when you cannot get someone with a pump.

## Remove wetted materials

It is important to remove water-damaged material from your house quickly to make it easier to clean and dry your house.

Take all material contaminated with sewage out of your house as soon as possible. Appliances and upholstered furniture are not recoverable. Tag these as contaminated waste to prevent others from picking these up and re-using them. Contact your municipality to find out how to dispose of contaminated material.

Move clothing and bedding to the outside and decide how to clean and dispose of cloth materials once they are outside. Put paper, books and other materials into tagged plastic containers and move them outside, to a garage or shed. Cleaning of many items is either labour-intensive, very difficult or impossible. This is the time to throw away things you can part with. Identify the materials you want to keep and which should be given priority for cleanup.

Remove wetted carpets and dismantle raised-floor assemblies in the basement. Tag sewage-contaminated materials for disposal in landfill. Even if the flood water was relatively clean, it is unlikely that wall-to-wall carpets can be cleaned sufficiently well or worth recovering. The exception is valuable area rugs that you can send out for professional cleaning.

Open up finished walls, cutting several feet above the waterline. High humidity can make wall cavities damp and they can become moldy. Even if walls seem to be dry, check—particularly if water has been left standing for several days. You must expose hidden surfaces for cleaning.

Remove finished walls completely if:

- the water level was several feet high;
- it took many days or longer before the water was drained; or
- the area was very humid for a prolonged period.

Examine acoustical tiles closely even if they were not wetted, since they absorb moisture when they are exposed to humid conditions.

### Washing down

Remove the worst of the dirt by hosing down the surfaces. For large areas, use a hose with a detergent attachment—available at hardware stores and garden centres. For smaller areas, use a spray bottle to spray detergent on the soiled areas to make it easier to remove dirt.

When you have removed most of the dirt, check again to see what else must be removed or opened up for further examination.

Clean surfaces by scrubbing with detergent and water. Follow by rinsing. If sewage came in, you may want to repeat the process as many times as you feel will get the surfaces clean.

Drain the water. If necessary, you may need to have a contractor to pump the water again.

## CLEANING MATERIALS

**Chemical disinfectants, fungicides or microbial biocides are not recommended. Chlorine bleach is no longer recommended.**

The only cleaning material you need is dishwashing or all-purpose liquid detergent. Select an unscented detergent, since perfumed detergents can mask the odours that tell you there is a lingering or new problem.

Scrubbing with water and detergent and then rinsing should eliminate bacteria from surfaces. There is no need for a disinfectant or biocide. If you think that repeat washing and rinsing is not making an item clean enough, perhaps you should throw the material out.

Concrete surfaces with stubborn stains or grease that are not removed using dishwashing detergent can be cleaned with TSP.

"Trisodium phosphate" (TSP) is a very aggressive compound. It is often used to clean concrete or badly soiled paint. TSP is corrosive—it will burn and sting. Wear gloves and goggles when using TSP. Follow the manufacturer's mixing instructions and sponge TSP on to the surface.

Use TSP very, very carefully and rinse well.

**Do not use chlorine bleach**

Chlorine bleach is a five per cent sodium hypochlorite solution. In the past, it was recommended for cleaning up mold. Now, Health Canada, CMHC and other agencies no longer recommend using chlorine bleach to clean up mold.

## Drying things out

Once you have cleaned a material, you must dry it as completely and as quickly as you can to prevent mold and bacteria from growing. Rapid removal of water is needed before things can dry out.

First remove as much water from the surface of materials as you can:

- Use squeegees, mops or cloth.
- You can also use a wet-dry vacuum or shop vacuum. These vacuums get more water off surfaces and out of materials after you have rinsed them than any other method.
  Because of their power and ruggedness, they can get big jobs done more quickly.
  Wet-dry and industrial vacuums may have attachments that make it easier to vacuum hard-to-get-at places. When work is completed, clean the vacuum thoroughly.

The final drying can be done in several ways, each with advantages and disadvantages.

| Method | Advantages | Disadvantages |
|---|---|---|
| **Natural ventilation** | Requires little energy. It is important to generate rapid airflow within each space and to remove enough air to get the evaporated water outdoors as quickly as possible. | Must be enough natural ventilation in the house.<br>Can be very slow, especially in damp or muggy weather.<br>If outside temperature is close to freezing, add heat while ventilating (see the caution about upper temperature limits under "Heaters" in this table). |
| **Mechanical fans** | Make drying faster when outdoor air is dry and not too cold. | In damp, muggy weather, the air coming into the house is already loaded with water vapour and must be heated before it can remove much water (see the caution about upper temperature limits under "Heaters" in this table). |
| **Heaters** | Together with mechanical fans, heaters help in drying in cold temperatures. | Do not heat air to more than 35°C (95°F)—air that warm can distort wood furniture and trim.<br>Combustion heaters—oil, propane or natural gas—produce water vapour and add moisture to indoor air if they are not vented. |
| **Dehumidifiers** | Use less electricity than heaters for the same drying effect—you get more drying for each watt of electricity with a dehumidifier. | Choose dehumidifiers that work even at low temperatures. |

Test whether drying with outside air using mechanical fans is fast enough by measuring the relative humidity before you run the fans and again an hour later. If unchanged, you may have to provide supplemental heat or use dehumidifiers. You may need more than one unit. See Appendix A—"Selecting a dehumidifier," page 35.

# CLEANING THE HOUSE

## FLOORS

### Flooded floors

To prepare floors for cleaning, move removable floor coverings and furniture outdoors. 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—damage that will dramatically increase repair costs.

- Remove and discard carpets that were flooded with sewage. See "Carpets" on page 12.
- Flooded solid wood or laminate floors are unlikely to be salvageable.
- Dismantle and remove sleeper floors (raised floor on basement slab). Don't save particleboard, plywood or oriented strand board (OSB) that has been soaked or wetted. Re-using it can create future problems.
- Ceramic tiles can lift and loosen. Contaminated water can seep under ceramic titles, even if they aren't loose. Consult a professional tile layer.

- Floor coverings on concrete—vinyl, linoleum and other materials—raise two questions:
  - Have they lifted and created pockets of dirt and water?
  - Will the pockets prevent rapid drying?
    If the answer to either question is "Yes," remove the floor covering and throw it out. Flooded vinyl tiles on a subfloor delay drying of the subfloor. You have to remove them and throw them out.

Treat each case as unique and examine the situation carefully before you decide what to do. Sometimes upper-level wet floors can successfully dry downwards toward a removed or missing ceiling below, but they are likely to buckle when dried that way. Fixing a buckled floor is more trouble and more expensive than scrapping floor tiles or sheet flooring.

### Floors that were not flooded

Examine main floor subfloors and floor joists that did not get flooded, but were exposed to high humidity, for mold growth.

The best way to remove mold from the surface of wooden boards (for example, main floor joists) is sanding with a vacuum-sander. Simultaneous vacuuming and sanding minimizes dispersal of dusts and mold spores.

You can clean mold on the underside of a main floor from the basement with unscented detergent and water and then rinsing with a damp rag. Avoid getting the wood wet. The top surface of a subfloor can be cleaned in the same way. Dry subfloors quickly.

After cleaning the subfloor, vacuum it thoroughly with a HEPA vacuum cleaner or central vacuum that exhausts outside.

## CARPETS

### Carpets on floors that were flooded

Throw out a carpet in a basement flooded with sewage-contaminated water. Even if the water has no sewage, it may not be worth saving the carpet—particularly if the carpet has been under water for more than a day.

You cannot save carpet underpads. Remove them and throw them out.

You may be able to save very expensive carpets. Move rare and expensive carpets and rugs outdoors. If heavily soiled, rinse both sides several times. Contact a professional carpet cleaner about what to do next.

The cleaner may suggest only simple, preliminary drying measures to reduce shrinking and fading. Usually, you have to wrap the carpets and rugs in heavy plastic and get them to the cleaner. Getting them to the cleaner rapidly is vital, as you and the cleaner are in a race against deterioration from dirt and microbes as well as water damage.

### Carpets on floors that weren't flooded

Evaluate carpets on upper floors based on how long they were subjected to humid conditions. Odour is a useful indicator. A musty or stale odour indicates that microbes have started to grow. You may need professional cleaning help to get these cleaned. It may not be possible to clean severely affected carpets.

## WALLS

This advice is not necessary if only the floor has been flooded for just a few minutes with relatively clean water. However, you may have to remove baseboards and mouldings to check for trapped dirt and water.

Clean walls as soon as possible to prevent the growth of microbes that could cause health problems for workers or occupants.

Answering the question of how far above the flood line a wall should be opened depends on how much water there was and how long it took to remove the water and dry the wall. If the water was drained quickly (within hours) and drying started immediately, opening the wall a few feet above the flood line may be sufficient. If the flood water stood for longer than a day, you will have to remove the walls completely.

Break open wet walls and walls that have absorbed water above the flood line so you can clean the interior cavities. Do not rebuild the wall until the area is completely dry.

Clean all walls in a flooded house, even those on floors above the flood line, because they have been exposed to excessive humidity long enough to start mold growth. This growth is often difficult to see without special instruments and techniques. Don't assume that surfaces are all right because they are one

floor above the obvious problem zone. Clean with unscented detergent and water, using a sponge or rag, and rinse with a clean, wet rag. Avoid getting the walls too wet.

## Inside wall and floor cavities

When flooding puts water inside walls and the cavities between ceilings and floors, hidden materials usually become waterlogged and contaminated. Too often, contaminated cavities are left closed. These cavities must be opened and thoroughly cleaned and dried.

If you suspect that a cavity has become wet, probe or open it to find out if it actually is wet. Soon after the main flood water is removed, drill small holes near the bottom of cavities for drainage Later, use moisture probes or check drillings for dampness. Whenever you find wet material in a cavity, open it for cleaning and drying.

Empty the cavity of insulation, debris or dirt, and dry all interior materials. If wood structural members are saturated, it may take days or weeks for them to dry completely and you can close the cavity again. The more quickly you open hidden spaces, the less water saturation there will be and the faster materials can be dried to safe levels.

## Wet insulation

Fibrous insulation materials (such as glass fibre, mineral wool and cellulose) don't have to be wet to pick up contamination. In a flood, their surfaces can pick up large amounts of contamination and trap it. If fibrous insulation materials stay wet for extended periods, molds and other microbes can grow. Fibrous insulation also loses its insulation capabilities even after drying, so you must replace it.

Board insulation, such as Styrofoam™ and urethane, can also become saturated. It takes longer for urethane and extruded Styrofoam to become saturated than bead-board Styrofoam. The safest action is to remove and replace these materials unless you are absolutely sure they are not trapping water or dirt.

Given enough time, all insulation materials will wick water up above the high-water mark. That rising damp region can reach half a metre (1 to 2 ft.) in a few days under some conditions. That's why you should remove

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 standard—or higher—that you set for other surfaces and materials. If you don't, once you close the cavities, problems will remain unseen and not fixed until they become severe.

## CEILINGS

Even if ceilings seem to be reasonably dry and undamaged, you should still check them. Water can wick up walls and around corners into ceiling materials. Check the condition of drywall and plaster to ensure that water or damp have not saturated the core materials beneath the surface. If they are saturated, replace them.

Carefully clean ceilings that are only damp at the surface to remove a thin film of mold that might have grown when the air was very wet or muggy. Good spring-cleaning practices should be enough. Dry rapidly, of course.

# APPLIANCES AND ELECTRICAL EQUIPMENT

***Your electric utility may have advice and suggestions for cleaning up after a flood. Check with your utility first.***

Don't go into a flooded area of your house until the electricity has been shut off and your electric utility says it is safe.

Do not use electrical equipment—outlets, switch boxes, fuse or breaker panels and appliances—until it has been inspected and passed as safe by your 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 live and dangerous.

After rinsing small appliances, send them to a repair shop—being sure to tell the repair shop that they have been flooded. If there is sewage contamination, cleaning and repair may not make sense—repairs may cost more than they are worth.

When the electricity is off—and only when it is off—wash and rinse electrical outlets and switch boxes. Be sure that all electrical supply materials and equipment are perfectly clean and dry before power is turned on again. Wet floors conduct electricity well, so be careful.

If larger appliances—washing machines, clothes dryers, dishwashers and so on—were completely or partly under water, don't use them until they are repaired and cleaned. Water and dirt in motors and switches can cause severe damage—and electrical shock. Be sure to tell the repair shop about any known or suspected contamination.

Have your clothes washer and dryer repaired first so you can get a fast start on cleaning clothing—but only if a day-or-two turnaround is possible. Otherwise, find another way to clean and dry your clothing.

## LIGHTS, FIXTURES AND WIRING

Light fixtures and sockets left dirty after a flood can cause shocks and equipment damage. Dirt can get into surprisingly small spaces that can stay wet for a long time when room air can't dry the space.

Once the power is off, or after you have disconnected your lamps, take them apart and check for dirt and damp. 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 bulbs. Some apparently good bulbs will shatter when they are turned on, so get a shade between you and the bulb for the first trial.

## FURNACES AND WATER HEATERS

If you were flooded in the spring, fall or winter, you will need heat to help dry your house. In the summer, your air conditioner can help dehumidify your house until you can put industrial dehumidifiers in your house.

You will need heat or air conditioning as soon as possible.

Don't use flooded furnaces, water heaters or air conditioners until a trained repair person has certified them as safe to use.

Have the furnace blower motor and all the many switches and controls inside a typical furnace replaced. Sometimes, to get heat going quickly, the service person will replace your furnace with an overhauled one with a similar rating.

After servicing, check the inside of the furnace case to make sure it is as clean and dry as other surfaces in your house. In the days and weeks after flooding, replace the furnace filter often—using a medium efficiency filter, such as a pleated paper filter.

Flooding can make the glass fibre that insulates water heaters soggy and saturated. If that is the case, remove it and have it replaced. The insulation may 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 of the contaminants (including clays) in flood water. Cold water will do just fine, although barely-warm water will aid drying slightly.

### Ducting

***Clean ducts wetted by flooding until they shine.***

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

Ducts are much cleaner after they are taken apart and reassembled than if they are cleaned with a vacuum hose. Choose a contractor who can do the job properly.

Return duct pans, which are nailed to the bottom of floor joists, are not particularly airtight and are less airtight if joists have been wetted and dried again. Have them taken down, clean them and re-install them, making sure that they are installed with crimps and sealing gaskets that will keep them airtight and quieter.

This is also a good time to seal ducting leaks, which will cut your heating costs and make your house more comfortable.

## PLUMBING

A flood can reverse water pressure in plumbing pipes and contaminate the water in hot and cold pipes. Have a plumber flush your plumbing pipes. Consult your health authority. Normal use of water afterward should keep the pipes clean and well-flushed.

## Floor and footing drains

A flood can drive water up through floor drains and sump holes and bring materials into a house that should never be there. As the water goes down, it can suck or wash indoor materials into drainage systems. The materials can either partly block the drains or just sit in the drains and rot.

For health reasons, carefully flush floor drains and sump pits. You may have to scrub surfaces to remove greasy dirt and grime that can release pollutants into the indoor air.

The footing drains outside your foundations may have seen more water and dirt than they could cope with during the flood. Have a qualified plumber—preferably one specializing in drainage—check them out. Drains can often be cleaned with special clean-out pipes or from the connection to the storm sewer. If they cannot, you may have problems in the spring or very rainy periods, when they will not drain as well as they should.

# WHAT TO THROW OUT, WHAT TO SAVE

Many materials can't be cleaned and dried. It may be impossible to thoroughly clean plush furniture, magazines and books, beds and fluffy bedding such as duvets and comforters. It will usually take days to get them dry, even in the best of 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 throw out inexpensive possessions that have been soaked. Don't waste time on them—there are so many other important things to do.

It is likely that cheap particleboard furniture will be unusable, so don't try to save it. Save antique or solid wood furniture instead.

Get regular broadloom and underpad out the door as soon as possible. With them may go piles of dirt and thousands of litres of water, making cleaning and drying much easier.

Save only very expensive carpets and rugs.

Throw out wet glass-fibre, mineral-wool and cellulose-fibre insulation as soon as possible. Even when dried, these types of insulation will never insulate well again. They can also support extensive mold growth for years and cause serious health problems.

Don't try to save electrical equipment that has been inundated or water-filled.

## FURNITURE

Furniture may be difficult or almost impossible to clean if it is upholstered or if sewage or other organic materials are involved. Antiques may be worth the expensive treatment it takes to remove sewage or organic debris. Other upholstered furniture is not worth the effort. Be sure to tell the restorers that there is sewage contamination. Move fast and follow their instructions to the letter.

Particleboard furniture is probably not worth the work and expense it takes to save it, unless the dunking was short and there is no apparent swelling. In that case, rinse well 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 surfaces show distress or warping starts. Open drawers to speed drying, but do not fully disassemble them, because of possible distortion.

Clean good-quality wood furniture with detergent and water, rinsing with a clean, wet cloth, 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. If necessary, apply surface waxes to slow drying of outside surfaces and allow inside ones to catch up. Professional care may be the best for better-quality items. Decide quickly.

## BEDS AND BEDDING

Do not save mattresses and box springs. They are too difficult to clean and dry.

Wash bedding several times to get it clean. Then rinse and carefully dry. Air-drying in a power dryer may be the best way to minimize damage. If there is no power, carefully remove most water by pressing fragile items and wringing fabrics that are more robust. Hang over several lines to distribute the weight of the wet item over several supports. This should reduce stretching. Drying outside in the sun has the added benefit of disinfecting with ultraviolet light.

Pillows cannot be safely cleaned and dried. Throw flood-damaged pillows out. They almost certainly have dangerous bacteria or molds.

Speed is of the essence with bedding. If it is not possible to clean it thoroughly within hours of water damage, rinse and dry it quickly and go back when you have the time.

## CLOTHES, OTHER FABRICS

Only experts can clean contaminated silks and woollens. Some decorative cottons are also at risk. Send these materials to a professional right away. Ask for an estimate before agreeing to a cleaning bill. Warn the cleaner if sewage contaminated the fabric.

Dry clean non-washable clothes that were above the high-waterline 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. After rinsing, dry these clothes as rapidly as you can without risking shrinkage. Do not use much heat—only what is needed for rapid drying.

It may not be worth the time and effort to clean some clothing. Throw it out, or save it until you salvage items that are more valuable.

Store cleaned clothes in an area that you have carefully cleaned and dried well. This space should be closed off from uncleaned spaces in your house.

## PAPER AND PAPER GOODS

Most paper items saturated by flood waters are not worth the time, energy and effort it takes to save them. First, identify valuable materials. Then focus on items that are not as wet and worth saving. Finally, get to the soaked items of lesser value.

When you dry paper you want to keep it pressed to prevent wrinkling. You can't do both at the same time.

Start by getting most of the water out of the paper. To do this, place the wet paper on blank, dry paper or thin, blotting material. Some experts recommend lightly sprinkling baking soda on the wet paper to help change surface chemistry and deter mold growth. However, there is a chance that any chemical will affect the inks and change the paper's chemistry. Test a spot to see if there are any dramatic effects before you use a chemical 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. Drying too rapidly may damage bindings; so be cautious. Getting paper dry quickly is important, but so is preventing damage.

Paper that is kept together wet for days may blend into an unsalvageable, solid mass. Act quickly.

## Freeze-drying

If you cannot take the time to deal with 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 there is sewage contamination, 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 those bags with food bags.

If you can use a freezer for wet paper only, it may be best to leave items unwrapped or lightly wrapped, as they will dry slightly during storage. Expert restorers use this technique, 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, you have to find a balance between drying too rapidly and too slowly. If paper is dried too slowly, mold 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. Consider all surfaces contaminated until they have been thoroughly cleaned and dried.

## Legal documents and valuable papers

Some documents are valuable for legal or financial reasons. Others have important sentimental value.

Make every attempt to clean and dry valuable papers using the previous instructions. Saving documents through such efforts will be less costly than paying to replace them.

If it is clear that there is mold damage or the possibility of severe distortion, 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 you can preserve this way.

You can replace other documents, such as birth certificates, marriage certificates, citizenship certificates, passports and other official government documents. Check with local government offices to find out what to do.

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

# THINKING AHEAD PREVENTING FUTURE DAMAGE

Homeowners who have gone through a flood in their basement are very aware of the time and work needed to deal with the damage.

Causes of flooding range from failure of municipal infrastructure to drainage deficiencies in individual houses. There are no simple or one-size-fits-all solutions. Preventing basement flooding can include solutions in individual dwellings, neighbourhood or subdivision measures and major municipal and regional system protection measures.

Check the priming of the floor drains. Find a way 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 into them to keep them primed.

Check your lot drainage, extending downspouts to lead rainwater away from the house, improving perimeter drainage and installing backwater prevention valves. See CMHC's *About Your House* "Avoiding Basement Flooding."

Change how you use your basement if you have been flooded before. Do not store materials on the floor or against basement walls. Store as little as possible in your basement—stored material is a liability when it gets wet.

When you refinish your basement, consider not having a carpet. It is preferable to keep the concrete floor bare. You can use an area rug over painted concrete. You can take an area rug outside and clean it thoroughly, something you cannot do with wall-to-wall carpet.

Also consider not installing a raised floor. The cavity created by a raised floor can hold moisture and allow mold to build up.

Operate a dehumidifier from spring to fall—especially important in basements that have flooded in the past. Elevated humidity levels trigger mold growth in areas that may not have been decontaminated. Keeping moisture controlled is a preventive measure.

Lastly, remain alert for problems.

# APPENDIX A—SELECTING A DEHUMIDIFIER

Try to get a large unit that can work at lower indoor air temperatures. When buying one, get a unit that is rated to be energy efficient. You may need more than one unit to get things dry fast. Borrow or rent additional dehumidifiers if you can.

Dehumidifiers are rated at a liquid removal rate, expressed as litres or gallons a day.

A rate of 10 gallons a day is equivalent to 45 L a day. Generally, this rating is for an indoor temperature of about 23°C (73°F)—but it 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. Dehumidifiers that don't have an automatic defrost cycle will stop removing water altogether when the air temperature drops below about 15°C (59°F).

If your unit does not have a fan to circulate air, then provide one, so that the air in the space is well mixed and the air moves fast enough over wet surfaces to move moisture towards the dehumidifier.

# FURTHER READING

Few publications deal with the problems involved in cleaning up a house after a flood. *Repairing Your Flooded Home*, an American Red Cross booklet funded by the U.S. Federal Emergency Management Agency, is a notable exception.

Single copies are available from:

FEMA Publications
P.O. Box 70274
WASHINGTON D.C. 20024
U.S.A.

It is also available from local chapters of the American Red Cross, as publication ARC-4477. Both these sources are designed to serve Americans but will supply single copies to Canadians.

# CLEANING UP YOUR HOUSE AFTER A FLOOD

A handy pocket book recommended for every homeowner, especially those in flood-prone areas. It's all here-information on managing plumbing breaks, sewer backups and the aftermath of flooding. You'll learn what to do in each case with topics including basic clean-ups, house decontamination and dealing with flooded electrical equipment. Also includes helpful tips on handling the after-effects of house fires.

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