



Minnesota Department of Health

Floods: Protecting Your Health

A few simple precautions can help you avoid possible health risks during a flood. This information answers some of the most important questions about floods and your health.

Fact Sheets for Disasters

A quick list of MDH flood fact sheets in PDF printable format.

Before Flooding Begins

Begin the process of preparing for a flood early. Information about steps that can be taken before flooding begins to protect your home or business, and the environment.

Protect Yourself

Clean-up work can be hazardous, so it's important to protect yourself. This Web page offers a few simple guidelines about what to think about before re-entering a home, personal protective equipment that you may need, and other safety concerns to think about.

Home and Business Clean-Up

While cleaning up your home or business after a flood, you need to protect yourself against hazards in your food, water, and air. Many hazards aren't obvious and

can't be seen—awareness of these hazards will help you work safely and protect your health.
asbestos | carbon monoxide | food safety | fuel oil | mold | septic systems | water and wells

Caring for Yourself

No one who lives through a disaster is untouched by the experience. Like other disasters, floods can result in emotional distress, as well as property damage. Recognizing and handling stress properly can help you meet the challenges of recovering from the flood and reclaiming your sense of control and security. This Web page contains links to information that address the impact of floods and strategies for coping.

Flood Information for Responders

Responding to disasters can be hazardous and emotionally draining, so it's important to take care of yourself. This Web page offers information to help Responders protect themselves and the health of the public in a disaster.

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Cleaning and Disinfecting Your Home After the Flood

Remember the golden rule of clean-up work

WASH YOUR HANDS THOROUGHLY

and do it often!

HANDWASHING

Simple basic hygiene - handwashing - is the single most important thing you can do to protect your health when you clean up after a disaster.

Be sure to wash your hands:

- After you touch any surfaces or objects that may have been in contact with debris or other contaminated material.
- Before you eat or drink anything, or touch your hands to your face.

The eight proper steps of handwashing:

1. Wet with hot (if available) water
2. Soap up hands and forearms
3. Work up a soapy lather, make sure to get back of hands and between fingers
4. Use a nail brush
5. Rinse hands
6. Use soap and lather up again
7. Rinse
8. Dry hands with paper towels

Cleaning

The four major steps to cleaning many items after the flood are:

- 1. Remove contaminated mud.** Shovel out as much mud as possible, then use a garden sprayer or hose to wash away mud from hard surfaces. Start cleaning walls at the bottom or where damage is worst. Remember to hose out heating ducts, disconnecting the furnace first.
- 2. Clean.** Scrub surfaces with hot water and a heavy-duty cleaner. Scrub off all contaminants with a brush. Rinse off soap.
- 3. Disinfect.** Bacteria can only be destroyed by disinfecting or sanitizing. This can be done by wiping or spraying surfaces with a solution of $\frac{1}{4}$ cup chlorine bleach per gallon of water or a product that is labeled with an EPA registration number as a disinfectant. After wiping or spraying with a disinfectant, put the item out in the sun, if possible, for additional natural disinfecting plus drying.
- 4. Dry.** Ventilate with an entrance and exhaust opening for air to promote cross-ventilation. Place a fan in a window or door with the fan to the outdoors. Seal the rest of the opening with cardboard, plywood or blankets so the fan can create a vacuum. Wood should have a moisture content of less than 15 percent before drywall, paneling or other coverings are placed over it. If available, use a room dehumidifier, empty it often.

How do I get my home cleaned up?

If you have water in or on walls and other surfaces:

- Cavities in walls, floors, and ceilings must be opened, cleaned, decontaminated, and thoroughly dried.
- Walls must be allowed to dry from the inside out.
- Remove moisture and debris from all surfaces and get surface materials dry within 24-48 hours.
- Release any water or mud that has been trapped in walls, ceilings, or floor cavities.
- Remove all interior wall finishing materials and insulation.
- Throw out any wet insulation.

REMEMBER!

- Most plaster, wallboard, and paneling will have to be thrown away.
- If you think you may have materials containing asbestos in your home, call the Minnesota Department of Health at 651-215-0900.
- Wear a mask to prevent inhaling contaminated dust, especially if you have allergies. Consult with your physician if you have questions.

If bedding is wet or potentially contaminated:

- Throw out mattresses and pillows.
- Clean blankets in the same way as clothing.

Salvaging Household Items

If you have wet carpeting:

- Pull up waterlogged carpet immediately, to prevent further floor damage.
- Carpet pads cannot be saved. They must be removed and thrown away.
- Attempt to save carpets or throw rugs only if they would be very expensive to replace.
- Clean and dry your floors thoroughly before re-carpeting.

If you have wet floors or hardwood:

- Remove any moisture or debris.
- Scrub floors and woodwork within 48 hours, using a stiff brush, water, detergent, and disinfectant.
- Allow all wood to dry thoroughly.

If you have wet furniture:

- Discard upholstered furniture if it has been exposed to water or contaminated material.
- Clean, rinse, and disinfect wood furniture.
- Place wood furniture outside in a shady area so it will dry slowly.

If you have wet appliances:

- If your hot water heater became wet due to flooding, it should be discarded. The insulation typically can't be replaced and the burner or heating element may be damaged and could cause an explosion or fire if used. If in doubt, consult a service professional before using.
- If the furnace was flooded, have it inspected and serviced by a professional furnace service before using.

Mildew

If mildew has developed because the molds weren't killed and the source is still damp, a strong product is required to remove it, and the required strength may ruin some household items.

Hard Surfaces

Mildew may be removed from walls and similar hard surfaces with this solution:

-1 gallon water, ¼ cup liquid chlorine bleach, 1 cup trisodium phosphate (available in hardware and - discount stores as TSP)

Follow all safety precautions when using this strong solution. Wash a small area at a time. Rinse quickly, and dry with a soft cloth.

Clothing

To remove mildew from clothing or textiles that are colorfast

Soak in a solution of 2 tablespoons liquid chlorine bleach and 1 quart water 5-15 minutes, then rinse.

To remove mildew from non-bleachable items

Mix 1 tablespoon fresh lemon juice and 1 tablespoon salt. Moisten the stain. If possible, spread in the sun to bleach. Rinse thoroughly. Another option is to soak the stain in 3% hydrogen peroxide for 15 minutes.

Mold

If any materials are still wet or moist after 24-48 hours, you should assume they have mold growing on them. See Dealing With Mold Problems After a Flood (handout enclosed).

Food Safety:

You should generally discard anything in soft packaging or screw-top glass bottles that may have gotten wet, or been in contact with contaminated material. You can sometimes save commercially canned goods in metal cans or rigid plastic containers.

To clean canned goods:

- Remove the labels
- Wash in water and detergent
- Sanitize with a solution of one tablespoon of bleach in a gallon of water.

Discard canned goods if:

- The surface is rusted and pitted.
- The can is swollen or leaking.
- The can is badly creased or dented at the rims or seams.

Goods in rigid plastic container can be saved:

- If they are not soiled around the cap or closure.
- If they do not have a defective closure.
- If they do not have a dented cap or crown, or an abnormal rim seal.

Discard refrigerated or frozen food:

- If it normally requires refrigeration, and it has been above 41 degrees F. for four hours or more.
- If it had been frozen, and it has been thawed for two hours or more.
- If it has deteriorated in quality, for example, if it has an unusual color or odor.

**If in doubt,
THROW IT OUT!**

Dealing with **MOLD PROBLEMS** *after a flood*

WHAT IS MOLD? And why can it be a problem after a flood?

Mold is a kind of microscopic fungus. There are many types of molds, and they are present throughout the environment, indoors and out. Tiny mold particles are always present in the air, in the form of tiny microscopic cells known as spores. Mold spores can germinate and grow in a moist or damp environment, on any surface that contains organic matter. *A home that's been flooded can provide ideal conditions for the growth and proliferation of mold.*

WHY IS MOLD A HEALTH CONCERN?

Indoor mold can trigger allergies or allergy-like symptoms affecting the upper respiratory system. Although other, more serious problems may occur if people are exposed to very high levels of mold, the most common complaints are:

- nasal and sinus congestion
- cough
- wheeze/breathing difficulties
- sore throat
- skin and eye irritation
- upper respiratory infections (including sinus infections)

The effect of mold on different people can vary widely. However, long-term exposure to high levels from indoor mold growth can eventually be unhealthy for anyone. The following groups of people may be at greater risk than others:

- infants, children and the elderly
- individuals with respiratory conditions or sensitivities such as severe indoor allergies and asthma
- persons with weakened immune systems (for example, people with HIV infection, chemotherapy patients, organ transplant recipients)

MDH recommends that you consult a medical professional if you feel your health is being affected by a moldy environment.

In addition to health complaints, mold damages building materials, goods, or furnishings when it grows on them. Mold growth and moisture may eventually compromise the building's structural integrity. Because of potential health concerns and damage to property, molds should not be allowed to grow and multiply indoors.

FINDING A MOLD PROBLEM: Investigate - don't test.

After a flood, many people become convinced - often with the help of an aggressive salesperson - that *testing* is the best way to find out if you have a mold problem. That isn't necessarily true.

The most practical and reliable tools for detecting a mold problem are your eyes and nose. If you see something that looks like mold, or you detect an earthy or musty smell, you should assume a mold problem exists. The presence of moisture or worsening allergy-like symptoms can also tip you off to a mold problem.

When you check for mold, be sure to:

- Look for visible mold growth (may appear cottony, velvety, granular, or leathery and have varied colors of white, gray, brown, black, yellow, green). Mold often appears as discoloration, staining, or fuzzy growth on the surface of building materials or furnishings.
- Search areas with noticeable mold odors.
- Look for signs of excess moisture or water damage. Look for water leaks, standing water, water stains, condensation problems. For example, do you see any watermarks or discoloration on walls, ceilings, carpet, woodwork or other building materials?
- Search behind and underneath materials (carpet and pad, wallpaper, vinyl flooring, sink cabinets), furniture, or stored items. Sometimes destructive techniques may be needed to inspect and clean enclosed spaces where mold and moisture are hidden -- opening up a wall cavity, for example. Be sure to use protective equipment and dust control methods described below.

MOLD TESTING: Expensive - and probably not helpful. People often have unrealistic expectations about what testing can accomplish, and are easily persuaded that it needs to be done. But mold testing is expensive, and it may or may not tell you what you need to know. Before you're tempted to have any testing done, try to check for possible mold problems on your own. The basic task is always to (1) find the location of any mold growth, and (2) determine the source of the moisture that's allowing the mold to grow. If testing isn't really needed, or it isn't done properly, you may be wasting money that could be used to *correct* a mold problem. Under those circumstances, it's not a wise or cost effective way of dealing with the issue. *If you see or smell mold, you don't need to test for it; clean it up instead.*

TAKE STEPS TO PROTECT YOURSELF

When mold is disturbed, it can greatly increase the amount of mold present in the air. The following precautions are recommended when working with moldy materials:

- Use rubber gloves
- Eye goggles that seal out fine dusts-like materials
- Wear outer clothing (long sleeved shirts and long pants) that can be easily removed before leaving the work area, and later laundered or discarded
- Wear a medium-efficiency or high-efficiency filter dust mask (available from safety equipment suppliers, hardware stores, or some building supply stores). At a minimum, use a unit designated as an "N-95" or equivalent dust mask.
- Do not eat, drink or smoke in the contaminated area, since disease-causing organisms from sewage or floodwater may be present.

People who have health problems or are very sensitive to mold should not do clean-up work in situations where there is heavy mold growth, or a high risk of disturbing materials contaminated with mold. People who are in poor physical condition should be extremely cautious about doing heavy work while wearing a respirator.

AVOID SPREADING MOLD CONTAMINATION

As you plan and carry out your clean-up activities, take steps to avoid spreading mold spores:

- Enclose moldy items in plastic (bags or sheets) before you carry them out
- When transporting moldy materials, use the shortest path into and out of the building
- Hang plastic sheeting to seal off the work area
- Remove the outer layer of work clothes before leaving the work area. Bag contaminated clothes or wash them separately.
- Damp clean all surfaces in and around the work area to remove any fine dust.

CLEAN-UP AND REMOVAL OF MOLD: The basic steps

- (1) **Identify and remove any sources of moisture.** This is the most important and the most basic thing you need to do. Mold can't grow without moisture. And don't forget to look for sources of moisture that aren't related to the flood.
- (2) **Begin drying any and all materials that got wet.** Do this as soon as possible. After the floodwaters have receded, water-soaked building materials and household items can be a significant ongoing source of moisture, promoting the growth of mold. They should be rapidly dried or removed from the building if possible. For severe moisture problems, use fans and dehumidifiers, and move wet items away from walls and off floors. Check with equipment rental companies or restoration firms to see if you can rent fans and dehumidifiers. However, to avoid spreading mold spores, do not operate fans if visible mold is already present.
- (3) **Remove and dispose of mold-contaminated materials.** Look for mold on porous items that may have absorbed moisture - including sheet rock, insulation, plaster, carpet/carpet pad, ceiling tiles, wood (other than solid wood), and paper products. If you see evidence of mold, these items should be removed, bagged and thrown out. Porous materials that may have been in contact with sewage should also be bagged and thrown away. Non-porous materials can be saved if they are properly cleaned and dried and then kept that way.
- (4) **Clean non-porous or semi-porous items.** Mold can grow on materials like hard plastic, concrete, glass, or metal - but it can usually be removed with careful cleaning. Solid wood items can also be salvaged through cleaning, if they are structurally sound. Bear in mind that mold spores and particles can cause health problems even if they're dead. For that reason, when you clean an item, the objective is to capture and remove the mold contamination.
 - For heavily contaminated items, begin by using a HEPA vacuum (not a conventional household vacuum or shop vac) to remove as much contamination as possible.
 - If you can't get a HEPA vacuum, carefully damp wipe the item, to remove as much surface contamination as possible. Rinse wipes often with clean water. Dispose of your wipes and rinse water frequently and properly - they'll be contaminated with mold.
 - After HEPA-vacuumping or damp wiping, thoroughly scrub all contaminated surfaces. Use a stiff brush, hot water, and a non-ammonia soap/detergent or commercial cleaner.
 - Collect excess cleaner/cleaning water a wet/dry vacuum, mop or sponge.
 - Rinse the surface or item . and the clean-up area -- with clean water. Collect the excess rinse water, and dry everything as quickly as possible.
- (5) **Disinfect surfaces (optional).** After removing all visible mold and other dirt or soiling from contaminated surfaces, a disinfectant may be used to kill some of the mold that may still be present. Disinfection is not a substitute for cleaning and removal of mold. However, it's essential for items that have been in contact with sewage.

If you disinfect, follow these guidelines, and contact the Minnesota Department of Health for additional advice:

- Mix 1/4 to 1/2 cup bleach per gallon of water and apply to surfaces where mold growth was visible before cleaning. Apply with a spray bottle, garden sprayer, sponge, or some other suitable method.
- Collect any run-off of the bleach solution with a wet/dry vacuum, sponge or mop. Do not rinse or wipe the bleach solution from the items or surfaces being treated -- allow it to dry on the surface.

STAY ALERT FOR PROBLEMS . AND BE PATIENT ABOUT REBUILDING

Continue to look for signs of moisture or new mold growth. Pay special attention to areas where mold grew previously. If the mold returns, repeat the cleaning process, and consider using a stronger disinfecting solution. New mold growth may mean that the contaminated material should be removed, or that you still have a moisture problem.. Be patient about rebuilding your home, or getting new furnishings. Wait until everything has been completely cleaned and dried . and remember that drying out wet building materials may take a long time.

A WORD OF CAUTION ABOUT CLEANING AGENTS: Bleach and ozone.

Bleach should always be handled with caution. **Never mix bleach with ammonia.**

Bleach can irritate the eyes, nose, throat, and skin. When working with bleach, always make sure the work area is well ventilated, and leave the area if your eyes or your breathing are affected. Use gloves and goggles to protect your skin and eyes. Also remember that bleach is very corrosive, and may damage some materials. Test a small area of the surface or item you're disinfecting, before you proceed. Bleach alone is not an effective way to combat mold. It won't reliably kill mold, especially if organic contamination (dirt, dust, mold growth, etc.) has not been cleaned away first. Bleach consists mostly of water, so it can actually provide some of the moisture needed for the growth of mold. And finally, bear in mind that bleach treatment doesn't actually remove mold spores or particles.

Gas-phase ozone has also been promoted by some commercial firms as treatment for mold problems. Some firms also sell "air cleaning" devices that produce ozone. However, studies have shown that ozone - even at high concentrations - is not effective at killing airborne mold or mold contamination on household surfaces. Even if the ozone killed some of the mold, the health threats would remain until the mold contamination had been removed through cleaning.

In addition, ozone is a strong oxidizing agent and a *known irritant of the lungs and respiratory system*. Health experts - including officials at Minnesota Department of Health - *do not recommend* the use of ozone to address mold or any other indoor air problems.

***For more information on mold and other indoor air quality issues,
contact the MDH Indoor Air Quality Unit: (651) 215-0909 or (800) 798-9050.***

***Online: Go to www.health.state.mn.us -
use the quick links menu and select Indoor Air Issues.***

Safety During Well Disinfection

ELECTRICAL:

EXTREME CAUTION is advised as you will be working with electricity and water. Potentially lethal voltages exist - if you are not acquainted with working with electricity, seek professional advice. Your safety precautions should include:

- Turn off the pump circuit breaker before removing the well cap
- While the breaker is off, examine for chafed wire insulation or missing wire nuts and repair as necessary
- Wear rubber soled shoes or boots, preferable waterproof

CHEMICAL:

Severe eye damage may result from contact with chlorine, including bleach and highly chlorinated household water.

- Users of the water must be warned not to drink or bathe with the water while chlorine is still present in the system.
- Do not leave bleach jugs lying around - ingestion of bleach is the most common toxic exposure for children in the U.S.
- Wear protective goggles or a face shield when working with the bleach

RESPIRATORY:

Well pits pose an extreme hazard as they frequently contain a build-up of toxic gases or simply lack oxygen to sustain life.

- DO NOT ENTER WELL PITS. Death can occur in even a shallow well pit
- Leave disinfection of wells in pits to licensed well or pump contractors.

Sewage Problems During a Flood

Flood conditions can cause a number of potential problems for users of private sewage treatment (septic) systems. This handout describes steps you can take to resolve flood related sewage problems.

- Whenever the water table is high - or your sewage system is threatened by flood water - you run the risk that sewage will back up into your home.
- Relieving pressure on the system - by using it less is the only way you can prevent a back-up.

What if a back-up does happen?

If you do end up with a sewage back-up problem, the following steps will help keep the damage to a minimum.

- Begin by removing all floor drain covers.
- Use mechanical metal grip plugs to seal the drains - and prevent sewage from entering the home.
- Repeat the process for toilets, bathtub drains, and shower drains.
- Metal grip plugs are available at plumbing supply stores.

What if my system becomes flooded?

Stop using your sewage system:

- If your septic tank or drainfield becomes flooded.
- If you can see any raw sewage or "grey water" on the surface of the ground, as a result of waste water leaking from your system.
- If wastewater begins to enter your home through drains or plumbing fixtures.

After the flood

If your drainfield has been flooded, you may or may not be able to use it again. You may need to relocate your drainfield to a site with more suitable soil conditions.

If you need help in determining whether to relocate your drainfield, contact your local planning or zoning office.

What do I need to do after the flood is over?

After the flood waters recede, check to see if any major system components have been under water.

Check septic tanks, drop boxes, distribution boxes, lift stations, and any other vault type structures. If any portion of the system has been in contact with flood water, be sure to pump out all solids and liquids before using the system again.

If your drainfield was under water, you will need to wait until the soil dries out sufficiently before using the system. There should be no saturated soil within three feet of the system, and there should be at least three feet of unsaturated soil between the bottom of the system and the water table.

For more information go to the University of Minnesota, Extension Service, Protect your septic system from flood damage (<http://www.extension.umn.edu/extensionnews/1997/JN1062.html>)

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Water Testing and Safety After a Flood

Safe drinking water and proper wastewater treatment is important. Flooding presents special health risks and requires extra attention for private wells and septic systems.

If your well has been flooded, you need to disinfect it to protect your family's health. Floodwaters carry bacteria, viruses, and parasites, as well as chemicals. Diseases such as dysentery, hepatitis and giardiasis can be transmitted through private wells that have been contaminated by floodwaters. Chemicals such as pesticides, solvents and petroleum-based products also pose health risks.

Sediment that enters your well during flooding can cause problems for the pump and plumbing systems. Bacteria that cause a rotten egg smell and stain plumbing fixtures may also be introduced during flooding.

Disinfection kills living organisms but will not remove other chemicals or sediment. Until you disinfect the well, boil water for a minimum of 1 minute (CDC); 5 minutes to provide increased levels of safety (MDH) and 10 minutes to further assure safety. Cool before use. Do not contaminate water with dirty utensils, hands or containers after boiling. Household treatment systems do not provide adequate protection against disease and should be disinfected. Water softeners and water heaters should also be disinfected.

If floodwaters covered the top of your well, you need to disinfect the well and household plumbing. If you have a shallow sandpoint or driven well and floodwaters approached it -- even if it was not inundated -- you should disinfect to make sure the water is safe to use. After disinfection, test the water supply to make sure you have completely eliminated disease-causing organisms. Use a lab certified by the Minnesota Department of Health.

Shock chlorination of a private well is relatively simple, but a contractor or plumber could be hired. To guarantee disease-causing organisms are completely eliminated, they must be exposed to chlorine at a high enough concentration for an adequate time.

Taking care of your septic system to help it recover from flood damage is important, too. First, pump the septic tank and distribution box as soon as possible after the flood to remove silt and debris. Also, don't compact the drainfield by driving or using heavy equipment on it. The saturated ground is especially susceptible.

Review all electrical connections and wiring BEFORE turning the electricity back on. Also check to make sure the manhole cover is secure and the inspection ports are not damaged or blocked.

Finally, check the drainfield area for erosion or animal damage. If needed, repair erosion damage; sod as soon as possible if the vegetation over the septic tank or drainfield has been destroyed. If sewage has backed up into the house or garage, thoroughly disinfect the area, because disease-causing organisms in wastewater present a serious health threat.

For more information, call the University of Minnesota Extension Service office in your county and request Fact Sheet #6213, Safe Drinking Water From Wells in Flooded Areas. You can also contact the "INFO-U" line. INFO-U is a **free** public service of the University of Minnesota Extension Service. Telephone messages are also available 24 hours a day, 7 days a week, using a touch-tone phone. Phone **(612) 624-2200** in the Metro area, or **(800) 525-UofM (8636)** in Greater Minnesota. Follow voice instructions to make your selections.

