



Flood Cleanup Health Tips



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Several kinds of diarrheal illness and other communicable diseases are more common in areas that have flooded. The major reasons are the use of unsafe water and unsafe food.

This brochure contains information compiled and summarized from various national, state, and local health agencies. The purpose is to provide one convenient source of emergency health information for those who must return to, live in, and salvage flood-stricken homes.

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DISINFECTING WATER

When cleaning up after a flood, hand washing is the single most important thing you can do to protect your health and the health of other members of your household. For this you will need safe water.

DRINKING WATER

All water possibly contaminated by flooding must be disinfected, whether from wells, springs, or cisterns. If available, bottled water which has not been in contact with flood water may be used during cleanup. Flooding often disables power or gas service along with other utilities, making it difficult to sanitize flooded wells and restore refrigeration. In such cases, bottled water may be the best choice for household water until utilities are restored. You may use your own bottles and fill them at a source known to be safe.

Other drinking water should be treated by one of the 2 methods given below. Note: if the water is excessively turbid (cloudy or colored), it may be difficult to sanitize it without boiling.

1. Boil water for five minutes and store in a clean container. The flat taste can be eliminated by shaking the water in a bottle or pouring it from one container to another.
2. Mix 5 drops of household bleach with 1 quart of water (or 20 drops per gallon) and let stand for at least five minutes (preferably 30 minutes to an hour) or longer before drinking. Bleach should be unscented and free of detergents or additives. This water will be suitable for drinking, hand washing, and for washing pots and utensils. An insulated beverage container with a bottom spigot is useful for storing a small supply of drinking and culinary water.

Public service announcements may indicate a source of water provided for the public as a part of the disaster response plan. Disaster response agencies may make interim bottled or tanked water available to the public. This may allow you time to sanitize and renovate your household water supply.

DISINFECTING HOME WELLS

Once floodwaters have receded and power has been restored, wells, springs or cisterns should be adequately protected against all known sources of contamination before disinfecting the supply. Guidance for disinfecting various sizes and depths of wells are given on page 4, Table 1.

To disinfect most wells, mix two quarts of liquid household bleach with ten gallons of water and pour the contents down the well (inside the casing). If available, run a hose to the well and run water down the inside of the well casing, being sure to wet all of the interior well casing, for fifteen minutes. This will cause the chlorine to mix with the water in the well and will also allow you to disinfect all of the well casing.

Replace well cover and turn on all water taps, starting with those farthest from the well and moving towards the well, until there is an odor of chlorine. Turn off the water and do not use it for eight hours. Then open all taps and spigots and flush out the chlorine. Keep flushing until the chlorine odor has disappeared. Do not flush chlorinated water into perennial streams or lakes.

It is not advised to use your septic system for flushing chlorine water, but if you must, adjust the flow of faucets or fixtures that discharge into septic systems to a very low rate of flow to avoid overloading the system.



TABLE 1 - Disinfecting Household Wells (Using 5.25% household bleach)

Household bleach (5.25 to 6%) should be mixed with water before adding to the well casing at the rate of 1 cup or less per 5 gallons of clear water; 2 cups to 1 quart in 10 gallons of clear water; and 2 or more quarts of bleach in 20 gallons of water. Then follow the steps given above.

Note: Depth of water in well is measured from the static water level to the bottom of the well.

DEPTH OF WATER IN WELL (ft)	DIAMETER OF WELL (INCHES)					
	4" CASING	6" CASING	8" CASING	24" DUG WELL	36" DUG WELL	48" DUG WELL
5 FEET	1 cup	1 cup	1 1/2 cups	4 cups	3 quarts	5 quarts
10	1 cup	1 cup	1 1/2 cups	3 quarts	6 quarts	2 1/2 gallons
15	1 cup	1 cup	1 1/2 cups	4 quarts	2 gallons	4 gallons
20	1 cup	1 cup	2 cups	5 quarts	-	-
30	1 cup	2 cups	4 cups	-	-	-
40	1 1/2 cup	2 cups	1 quart	-	-	-
60	2 cups	4 cups	2 quarts	-	-	-
80	2 cups	1 quart	2 quarts	-	-	-
100	3 cups	1 1/2 quarts	2 1/2 quarts			-
150	4 cups	2 1/2 quarts	4 quarts	-	-	-

The effectiveness of disinfection can be checked after completing the above process by submitting a water sample to a laboratory to be analyzed for the presence of coliform bacteria. The sample should be collected in a container supplied by a certified laboratory and taken in accordance with laboratory sampling instructions.

Samples should be collected only after the chlorine has been out of the system for at least 72 hours.

Sampling bottles and instructions can be obtained from the DPHHS Environmental Laboratory, 444-2642. Bottles and instructions can be mailed upon request

TABLE 1A Disinfectant Solutions Summary: (Household bleach 5.25% -- 6% sodium hypochlorite)

Condition	Solution
Sanitizing Drinking or Culinary Water, Hand Washing Water, and Utensils	5 drops of household bleach with 1 quart of water (20 drops per gallon)
For Salvaging Cans, Cleaning Flooded Walls, Surfaces, Counters, Floors, and Toys	1 cup of bleach with 5 gallons of water

**Use protective gloves & glasses and rinse this solution from metal surfaces after 10 minutes to prevent corrosion.*

Condition	Solution
For Disinfecting Flooded Wells, Plumbing, and Storage Tanks	2 quarts of bleach with 10 gallons of water (see Table 1 above)

**Use safety glasses, protective gloves, and clothing. Avoid direct skin or contact with these solutions.*

FOOD SAFETY

STORED FOODS

To prevent diarrheal diseases and other illnesses, **the following items should be destroyed if they have been exposed to flood waters:**

- | | |
|----------------------|--|
| ☐ fresh meats | ☐ medicines and |
| ☐ poultry | ☐ cosmetics |
| ☐ fresh vegetables | ☐ packages that are not hermetically sealed (airtight) |
| ☐ fruit | ☐ flour |
| • ready-to-eat foods | ☐ packaged frozen foods |
| ☐ lunch meats | ☐ other commodities in bags |
| ☐ cheese | |
| ☐ home canned foods | |

Shelf Stable and Canned Foods

Seepage can carry harmful bacteria into all but airtight containers. Contents of crown-capped bottles, screw-top glass containers (including canned food in glass jars), and unprotected flexible packages should **not** be used—it is very difficult to open them without spreading the contamination from the package closure to the food inside. Sealed metal cans are unsafe if punctured, bulging, or leaking.

Sealed metal cans and hermetically-sealed packages with protective outer packaging in good condition may be salvaged, but they must be carefully cleaned and disinfected before opening. If such packages are leaking, bulging, or show evidence of puncture they should be destroyed.



The recommended procedure for cleaning and disinfecting cans of food:

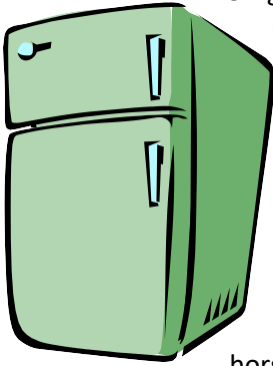
1. Remove labels, but mark the can in a way that will enable you to identify the contents after disinfection. Colored crayon, wax pencil, indelible marker, or adhesive tape may be used.
2. Wash cans in warm water containing soap or detergent. Then rinse the detergent from the can.
3. Soak the cans for at least 1½ to 2 minutes in a tub containing a disinfecting solution made by mixing a solution at the rate of 1 cup of household bleach* to 5 gallons of water. Rinse the cans in clear water that is bottled, disinfected, or which has been previously boiled for at least 5 minutes.
**Caution: This concentration of bleach will damage some fabrics and may have a pungent odor. Use waterproof gloves and do not wash your hands in this solution.*
4. Re-inspect the packages. If there is any doubt about the integrity of any package, do not use it.

Hermetically sealed foods which normally require freezing or refrigeration should not be salvaged unless they have been continuously held within the proper temperature range.

Refrigerated Foods

Flood conditions often disrupt natural gas, electricity and other utilities. Refrigerators will not operate when electrical power is out, and are often down for hours or days. If the refrigerator has been down for more than six hours, or if the food has been warmed to above 45°F for more than 3 hours, discard foods needing refrigeration (milk, eggs, meat, puddings, fish, and canned hams labeled "Keep Refrigerated"). Where power is expected to be reinstated within minutes, keep the refrigerator or freezer door closed as much as possible. Refer to Table 2 on page 6 for more guidance.

Where power is out or turned off and alternate refrigeration is not available, foods normally requiring refrigeration should be placed in insulated containers or ice chests and transported to alternate refrigeration as soon as possible. In no case should they be left without refrigeration for more than 4 hours. Wherever possible the temperature should be held below 45°F. If dry ice is available, it may be used for temporary refrigeration or to preserve frozen foods. If the times and temperatures are unknown, the food should be discarded. "When in doubt, throw it out."



There are a number of condiments and other foods which are typically stored at room temperature until after the packaging is opened or the product is partly used, at which point they are usually refrigerated. These may include margarine, hard cheeses, fruit pies, fruit preserves, breads, fruits, salad dressing, jelly, relish, barbeque sauce, tartar sauce, horseradish, mustard, and ketchup. These foods may be salvaged and placed in refrigeration if they have not been directly contacted by the floodwater.

TABLE 2 When To Save & When to Discard Refrigerated Food

FOOD TYPE		FOOD STILL COLD--HELD ABOVE 45°F FOR UNDER 3 HOURS	FOOD HELD ABOVE 45°F FOR OVER 3 HOURS
DAIRY	milk, cream, yogurt, baby formula	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
	butter, margarine, shortening	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
EGGS	fresh, hard cooked, egg dishes, egg salad, custard pies	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
	custards, puddings, egg batter (uncooked)	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
CHEESE	hard cheeses, processed cheese	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
	soft cheeses, cottage cheese, brie etc.	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
FRUITS	bottled fruit juices, opened canned fruits, fresh fruits, raisins, dried fruit, dates,	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
VEGETABLES	vegetables, cooked or raw; vegetable juices, opened, cut onions,	SAFE, if not in contact with flood water	DISCARD, if above 45° F for more than 1 day or if above 50° F for more than 8 hours
	baked potatoes, chopped garlic in oil or butter	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
	casseroles, soups, stews	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
MEAT POULTRY FISH	<i>Fresh or Leftover</i>		DISCARD, after 6 hours
	meat or poultry, raw thawing meat	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
	tuna, shrimp, chicken, gravy, stuffing	SAFE, if not in contact with flood water	
	lunch meat, bacon, sausage, dried beef, meat, pizza, canned meats (open), ham	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water

	canned ham labeled “keep refrigerated”	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
PASTRIES	cream or cheese filled	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
PIES	Pies, fruit	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
BREADS	Cakes, muffins, biscuits (cooked), corn chips, cooked cookies	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water
MAYONNAISE	refrigerator biscuits, rolls, cookie dough, cooked pasta, pasta salads w/ mayonnaise, or vinegar base, macaroni & cheese	SAFE, if not in contact with flood water	DISCARD, even if untouched by flood water
SPREADS	Tartar sauce, horseradish, chopped garlic, salsa (opened or fresh)	SAFE, if not in contact with flood water	DISCARD, if above 45° F for more than 1 day or if above 50° F for more than 8 hours
	Peanut butter, opened salad dressings, jelly, relish, barbeque sauce, olives, ketchup, mustard, taco sauce, apple butter	SAFE, if not in contact with flood water	SAFE, if not in contact with flood water

Frozen Foods

Frozen foods should immediately be transported to alternate freezers in well-insulated chests or boxes, or placed with dry ice. Those that have been thawed and then held above 45°F for more than four hours should be discarded. Those which are thawed for up to three hours and which still contain ice crystals and are cold as if refrigerated, may be re-frozen, and can usually be refrigerated and salvaged.

Some foods can be re-frozen even if they are above 45°F for a day or more. These include frozen juices, commercially packaged fruit, breads, rolls, cakes, pie crusts, commercial bread dough, flour, corn meal, and nuts. There is some risk of mold, yeasty smell or texture loss, including sliminess on the exterior of the food. If this occurs, discard the food.

Sealed bags of smoked fish require refrigeration at below 38°F. Discard those products if they are held above that temperature for more than 4 hours.

FOOD PREPARATION

Here are a few hints to insure safe and easier meals:

1. Boil or disinfect water used for food preparation as described in Table 1A on page 4 or bottled water that has not come in contact with flood water.
2. Wash hands and cooking utensils in clean or disinfected water (5 drops of household bleach with 1 quart of water (or up to 20 drops per gallon) and let stand for at least five minutes (preferably 30 minutes to an hour) as you would for drinking water (see row 2 on page 4). This mild concentration should be adequate for cooking, hand washing, or drinking, but it will taste better if stored in a clean vessel for a few hours before drinking.
3. Conserve fuel, water, and energy, as well as the number of cooking and serving utensils, by preparing casseroles and one-dish meals such as stews, pot roasts, and soups.



4. Boil and save the liquids of canned vegetables. Substitute them for water in recipes for soups, stews and other cooked dishes.
5. Drain and save juices from canned fruits. They may be mixed and combined with other canned fruit juices and used as beverages and in making gelatin salads/desserts, instead of scarce water.
6. If your oven is in working condition, use it to cook stews, vegetables and other foods. Oven cooking will require less attention and free you to do other tasks while the meal cooks.
7. If you lack refrigeration, cook only as much as can be eaten at one meal. Avoid leftovers. If you have refrigeration, you may want save time by preparing food for more than one meal in advance.
8. When purchasing formula ingredients for infants, such as evaporated or dry skim milk, be sure the containers are sealed. After opening in the home, be sure they are tightly covered to prevent contamination. In the absence of refrigeration, make up only enough formula for immediate use. If mixing powdered milk or dry formula, we recommend bottled water.
9. Avoid foods that are subject to quick spoilage and bacterial contamination, such as creamed foods, hash, custards and cream pies, salads and sandwiches mixed with mayonnaise or other perishables, unless refrigeration is available, or purchase individual portions (entrees) which you can heat, eat and discard the remainder.
10. Avoid keeping prepared or cooked food at room temperatures. Keep hot foods hot and cold foods cold. Plan your meals to avoid leftovers, unless you have refrigeration or insulated coolers with dry ice.
11. In general, during the flood, commercially canned and packaged foods are recommended: canned dried milk; canned meats, fish, poultry; canned fruits, vegetables and juices; packaged, dried or dehydrated foods; canned or packaged biscuits, breads, crackers, cookies; frozen foods which have not been exposed to flood water or thawed.



HEALTH AND HYGIENE ISSUES

ENTERING DAMAGED BUILDINGS

If there are any doubts about the safety of a building which has been flooded, do not enter it. Seek professional advice first, and arrange for assistance wherever possible. Information and advice may be available from the fire department or the Disaster and Emergency Services agency in your area. Also, shelters, safe food, and safe water may have been set up by a public service agency. Your local health department or sheriff may also be able to help provide information.

Even with guidance and assistance as mentioned above, when you do enter a damaged building, check it for buckled walls, electrical hazards, loose bricks, cracks or any shifting of the foundation.

Do not pump flooded basements out too quickly because the water-saturated ground around the basement could push the walls in. Also be alert for electrical hazards and downed power lines.

Follow the instructions of your utility company concerning the restoration of gas or electrical service. If unusual situations occur, call for guidance.

CLEANING CLOTHING AND BEDDING



Since disease-producing bacteria often carried by floodwater can remain alive for long periods in and on fabrics, care in laundering clothing and bedding is essential.

First, brush off all dirt. If the fabric is mud-stained, rinse in cool water until as much mud as possible is removed. Then wash as usual, using enough detergent to keep soil from re-depositing on fabrics.

The use of a disinfectant in the rinse water is especially recommended to destroy bacteria.

For white fabrics, household bleach is recommended. Your local market may have other products for other fabrics. Manufacturers' directions should be followed carefully.

Some types of mattresses soaked with floodwater should be discarded since reconditioning is too difficult to be done at home. There are types made with synthetic coverings or less absorbent materials which can be air dried (for several days) and sanitized, preferably in the sun, and may be suitable for re-use. The general recommendation is to discard them.

However, foam rubber pillows, if left in their covers, may be washed and air-dried. Do not use an automatic drier or dry cleaning solution.

MEDICINES

Discard all medicines exposed to flood waters and have all needed prescriptions refilled as soon as possible. If you have diabetes or other chronic disease for which medications are needed on an ongoing basis, contact your physician to be sure your prescriptions are current, and be cautious about substitutions. Your local public health nurse may be able to answer any questions you may have.



IMMUNIZATIONS

There is no indication for typhoid immunization in most flood emergencies. Typhoid immunization requires about six weeks to become effective. Immediate protection from diarrheal diseases is best provided by using only bottled water, water which has been boiled for five minutes or treated chemically, and by discarding food which may have become contaminated or which was not held at the proper temperature due to power outage.

Tetanus, Diphtheria (TD) booster is needed only on the recommendation of a physician in the case of an actual injury or wound. The flood itself imposes no additional risk of tetanus.

Information about communicable disease is often provided through the media during floods. Watch for information from the health department. Your local public health nurse can answer any questions.

WOUND CARE

Open wounds and rashes exposed to flood waters can become infected. To protect yourself and your family,

- ☐ Avoid exposure to flood waters if you have an open wound.
- ☐ Cover open wounds with a waterproof bandage.
- ☐ Keep open wounds as clean as possible by washing well with soap and clean water.
 - If a wound develops redness, swelling, or drainage, seek immediate medical attention.

For more information, visit CDC's website, Emergency Wound Care after a Natural Disaster <https://www.cdc.gov/disasters/woundcare.html>.

PERSONAL HYGIENE

Several simple rules of personal cleanliness should be followed:

- ☐ Wash hands with soap and bottled or disinfected water
 - after using the toilet
 - participating in flood clean-up
 - handling flood-contaminated articles
 - before and after smoking
- ☐ Use boiled or disinfected water for brushing teeth and other personal hygiene.
- ☐ Children are especially at risk of diarrheal diseases; wash your hands thoroughly after diaper changing, and before handling or playing with small children.



KEEP YOURSELF SAFE

Approach any damaged areas with caution. Hazards may include pesticides, harmful chemicals, or sewage in flood waters. Also watch for broken gas lines, electrical hazards, dead animal carcasses, displaced wildlife, and any other hazards that could be a potential threat to you and your family. If your electrical system is damaged, contact your utility company about restoring the service, or see an electrician before you attempt to reset breakers or use electrical equipment.

Below are a few reminders:

- ☐ Set priorities to accomplish the vital tasks first and avoid physical overexertion; rest occasionally.
- Regardless of the crisis, be sure children are safe and being cared for at all times. Never leave them alone or allow them to play in flood-damaged buildings or areas that might be unsafe. Keep them away from ponded water; it could contain dangerous pathogens or chemicals.
- ☐ Give special attention to cleaning children's toys, cribs, playpens, and play equipment. Items a baby or toddler may put in his mouth should be boiled, or disinfected as shown in **Table 1A on page 6**. Discard all stuffed toys and items that are not easily cleaned or are water logged.
- ☐ Read the Food Safety section on page 5.
- ☐ Keep chemicals used for disinfection and poisons for insect and rodent control out of reach of children.
- Wear protective clothing covering limbs, feet and hands while cleaning up debris and rubber gloves while scrubbing flood-damaged interiors and furniture.
- ☐ Be sure electrical appliances are dry and in good condition before using.
- ☐ Monitor radio and television bulletins for information concerning emergency housing, rations, emergency toilet facilities, travel, and other important guidance for residents of the flooded area

☐ Make a list of emergency phone numbers to keep on hand

- Fire department
- Sheriff's office
- Local public health department
- Local Disaster and Emergency Services (DES) Coordinator
- Local public waterworks office
- Public Water Supply Section of the MT Department of Environmental Quality
- Local Environmental Health Office (Sanitarian)
- Others



- Be cautious about entering enclosed spaces where gasses may have accumulated—sewers, manholes, basements, or other enclosures. You cannot always smell toxic or explosive gas.

☐ If you find a propane tank (whether a small 20# tank or a larger household tank) it may be a hazard to move or disturb it. Contact your fire department for help.

Additional information can be found on the web at: [CDC Emergency Flood Precautions](#)

HOME SANITATION

☐ Personal hygiene, particularly hand washing is one of the most important measures for preventing illness from flood contamination. Always wash hands before eating!

☐ Do not use contaminated water or water which is questionable, for any domestic use, including cooking, drinking, bathing, brushing of teeth etc., until it has been treated.

☐ Look for a source of safe water such as a relative or friend in an area not affected by the flood, and obtain a supply in clean plastic jugs. A beverage cooler with a spigot near the bottom will be helpful for hand washing and getting started on cleanup safely.



- Persons on contaminated community water systems should boil the water or treat it with household bleach (see page 4) or use bottled water, until official notice is given that the water supply is safe.
- Clean the building of all silt and refuse left by the flood. After dirt has been removed all wall and floor areas which have been touched by the floodwater should be washed down with washing powder or concentrated detergent solution (not soap) and then rinsed with a chlorine solution. If a "flood smell" remains, the building has not been thoroughly disinfected.

- Steam-clean all carpeting. Many parts of the cleanup involve drying, possibly using ventilation fans.

☐ Fiberglass insulation that has been exposed to floodwaters should be replaced.

☐ All eating and drinking utensils should be sanitized besides being thoroughly cleaned. See Food Preparation on page 6.

☐ Wash solutions used for laundering clothes, bedding, and other fabric items, should include a disinfectant. Laundry bleach or other commercially available products may be used. Follow directions on containers.

- Inside surfaces of homes contaminated by floodwaters should be cleaned with a solution involving powdered cleanser (use according to manufacturers' instructions). It is important to rinse affected walls and floors with a chlorine



solution (1 cup of household bleach to 5 gallons of water).

- After 10 minutes rinse chlorine solution from metal or wood grain surfaces to prevent chemical reactions or rusting.
- Do not apply strong chlorine solution to rubber, organic material, carpeting or absorbent surfaces.
- ▢ Dry ice may be used as temporary refrigeration. Be sure to use gloves when handling, and remember dry ice freezes anything and everything it contacts. Placing it in paper bags or several layers of newsprint will make it easier to handle.
- ▢ Remember that sewage often backs up into the house or basement during flooding. Rubber boots and waterproof gloves are needed during cleanup

MOLD

Since people can react to mold, whether it is living or dead, it must be removed. Take steps to protect your health during mold removal.

- If there is more than a little mold, use a mask or respirator that will filter out mold spores. Usually it will be designated as an N95, 3M #1860 or TC-21C particulate respirator.
- ▢ Wear eye protection, rubber gloves and clothing that can be immediately laundered.
- ▢ In addition to areas that were flooded, search for moisture in areas with a damp or moldy smell, especially in basements, kitchens and bathrooms.
- ▢ Look for water stains or colored, fuzzy growth around ceilings, walls, floors, windowsills and pipes.
- ▢ If you smell a musty odor, search behind and below carpeting, furniture or stored items.
- Inspect kitchens, bathrooms and basements for standing water, water stains and patches of out-of-place color.
- ▢ If you can, take furniture that has been wet outside to dry and clean, because direct sunlight prevents mold growth.
- ▢ Dispose of mold contaminated materials, especially porous items. It is impossible to completely remove mold from porous surfaces such as paper, sheetrock (drywall), wall paper, and carpet padding, so these materials should be removed and discarded.
- ▢ Use open windows, fans or dehumidifiers to dry surfaces as long as the problem remains.

Dampen moldy materials before removal to minimize the number of airborne mold spores.

Mold can be removed from hard surfaces such as hard plastic, glass, metal and counter tops by scrubbing with a non-ammonia soap or detergent. (Do not mix ammonia and bleach; the fumes are toxic.)

Scrubbing may not completely remove mold growth on structural wood, such as wall studs, so it may need to be removed by sanding. Wear personal protective gear and isolate the work area from the rest of the home.

After the mold is removed, disinfect the area using a bleach-and-water solution or another disinfectant. The amount of bleach recommended per gallon of water varies considerably. A clean surface requires less bleach than a dirty surface. A solution of 1/4 cup to 1/2 cup bleach to 1 gallon of water should be adequate for clean surfaces. The surface must remain wet for about 10 to 15 minutes to allow the solution to disinfect.

Concentrations as high as 1½ cups of bleach per gallon of water are recommended for wood and concrete surfaces that could not be thoroughly cleaned. Provide adequate ventilation during disinfecting and wear rubber gloves.

Finally, rinse the entire area with clean water, and then rapidly dry the surfaces.

If there is a lot of water damage, and/or mold growth covers more than 10 square feet, you may need to hire a professional.

MOSQUITO & VECTOR CONTROL

DISEASE VECTORS

Mosquitoes, rodents and ticks are among the principal vectors for diseases in humans in Montana. During flood conditions mosquitoes become the principal concern for residents of a community.

Increasing mosquito populations resulting from pooled water can increase the threat of mosquito borne diseases. More likely, however, increased mosquito populations will involve "pest" types of mosquitoes. Their effects will be expressed in terms of intense personal discomfort, and increased cases of secondary infections.

Not all water is ideal for mosquito breeding. Water which is open and, running water and water that is relatively free of emergent vegetation does not promote mosquito breeding. Temporary, shallow, standing water that lasts for five days during exceptionally hot weather can produce hordes of pest mosquitoes.

Typically (at peak air temperatures of 80 - 90 degrees Fahrenheit) the egg to adult developmental time will be 7 or 8 days. Mosquitoes lay their eggs on the surface of water which is typically shallow and has emergent vegetation. To determine if water is producing mosquitoes, dip out some water (near the surface and close to vegetation) at weekly intervals. Examine it for the aquatic stages such as eggs, larvae/wigglers, and pupae/tumblers.



WEST NILE VIRUS

West Nile virus (WNV) is often transmitted through the bite of an infected mosquito. It can potentially cause serious illness in humans and horses, such as encephalitis. West Nile virus first appeared in North America in 1999 and appeared in Montana in 2002.

Mosquitoes belonging to members of the *Culex* species are the most common carriers of WNV in the North America. In Montana, *Culex tarsalis* is the most common WNV mosquito vector and generally emerges in mid or late-summer.

How is WNV maintained in nature?

In nature, the virus is amplified during periods of adult mosquito blood-feeding and continuous viral transmission between mosquitoes and birds. People, horses, and most other mammals are generally considered "dead-end" or incidental-hosts. This means that mammals are not known help maintain WNV in nature.

What happens when humans become infected with WNV?

Many people who become infected with West Nile virus experience no symptoms. Some individuals develop a mild illness, called West Nile fever, which may last for three to six days. Generally, no treatment is needed. Other individuals, fewer than 1 out of 150, may become severely infected and develop symptoms of encephalitis or meningitis. These symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may be permanent. People typically develop symptoms between 3 and 14 days after they are bitten by the infected mosquito. In Montana, most human cases occur between late July and the first freeze. There is no WNV vaccine available for humans.

PROTECTING YOURSELF

Use these tips to help prevent mosquito bites.

- When you are outdoors, use insect repellent containing an [EPA-registered active ingredient](#). Follow the directions on the package. The U.S. Public Health Service and Consumer Reports state that the most effective repellent chemical is diethyl toluamide (DEET). Follow label directions and precautions. Care must be taken when using DEET on small children.
- Many mosquitoes are most active at dusk and dawn. Be sure to use insect repellent and wear long sleeves and pants at these times or consider staying indoors during these hours.

- ☐ Make sure you have good screens on your windows and doors to keep mosquitoes out. Repair window and door screens, and add screening where needed.
- ☐ Get rid of mosquito breeding sites by emptying standing water from flower pots, buckets, and barrels. Change the water in pet dishes and replace the water in bird baths weekly. Drill holes in tire swings so water drains out. Keep children's wading pools empty and on their sides when they aren't being used.

While organized mosquito abatement districts can do more to control mosquitoes than an individual or small independent group, property owners can protect themselves as well.

It is best if mosquitoes are controlled at their source. Although some types of adult mosquitoes may commonly fly from 3 to 5 miles, they thin out as they disperse from a rearing site, and most move only far enough to feed. Consult your local mosquito control organization, local health department, or your local Extension Office.

Guidelines for Reducing Mosquito Population

- ☐ Remove unneeded standing water on your property. Most aquatic stages die if water is removed. Discard tires, cans, and other items which hold water. Restore drainage.
- ☐ Stagnant pools or swampy places should be filled, drained, or deepened when practical. Remove debris and floating and emergent vegetation from those areas that cannot be filled or drained. Avoid having shallow pond margins; steep straight banks without emergent vegetation provide little cover for mosquito larvae.
- ☐ Ornamental or stock watering ponds can be stocked with fish. Trout or other game fish keep ponds from rearing many mosquitoes if vegetation is not too dense. Mosquitofish are effective.
- ☐ Surface irrigated fields should be properly graded. Low areas in fields that collect water are major sources of mosquito production.
- ☐ Do not over irrigate fields and pastures. Using only necessary amounts of water (with adequate fertilization) increases hay quality and yield as well as reducing mosquito production.
- Do not permit field laterals and drains to contain excessive amounts of vegetation. The on-field ditches should be regularly cleaned and maintained to reduce mosquito habitat.
- ☐ Biodegradable mosquito control "oils" may be applied to standing water. (Examine water for larvae prior to any treatment). These oils are much less harmful to fish and vegetation than kerosene or fuel oils and have been used where livestock take water (contact DEQ and/or Department of Agriculture for more information on larvicides).
- ☐ Registered insecticides can be applied to mosquito rearing water on your property if applied according to label directions by qualified persons.
- ☐ Keep lawns clipped and bushes trimmed to reduce the cover provided to adult mosquitoes.
- Registered insecticides can be used for adult mosquito control. They can be applied to adult resting places as short-term residual sprays, or space (contact) sprays can be drifted through areas on light air currents at dusk or dawn to kill adult mosquitoes present at that moment. All insecticides must be used in accordance with label directions and restrictions.
- ☐ In the event of a federally declared disaster, federal assistance for the control of mosquito vectors may be available, provided a serious health hazard to humans has resulted or is developing which is clearly beyond state and local capabilities. Such vector control needs are unlikely but would be investigated by the state and local health agencies.
- ☐ Mosquito control work to eliminate a nuisance condition is not eligible for federal assistance. You can obtain additional information regarding mosquito control programs from your local mosquito control district, local health department, or local Extension Office.

