



LOUISIANA
Mudout Manual

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MISSION STATEMENT FOR DISASTER RELIEF

To provide physical, emotional, and spiritual help to victims of natural and man-made disasters, including floods, earthquakes, hurricanes, tornadoes, fires, and terrorist attacks, in North America and overseas

- Our primary goal is to provide assistance to anyone that is in distress because of a disaster.
- At every opportunity we must insure that the gospel is made known to each person that we have contact with

Introduction

After an event that creates significant rain or in the case of hurricanes, it can be a storm surge, levees breaking or an amount of rain that is unable to run off, homes may have anywhere from several inches to being completely flooded. A flood response, particularly a mud-out, is much more complicated than it would appear on the surface. The following issues must be considered when entering a flood disaster area.

Just as with other DR activities, the Property Release Form must be completed and signed by the property owner. The site should also be looked at by the Assessors.

The responsibility of meeting all state and local regulations belongs to the Home Owner. These include hazardous materials inspections required by EPA, arranging and paying for dumpsters, etc.

Loss of personal possessions is an important issue. These may be gifts or something that has been in a family for years. They may remind the family of a deceased love one. As you work in the debris, be sensitive to the feeling of attachments to these objects. What you may think of as trash, someone else thinks of as treasure. Set aside any object that might be treasured or of value.

Materials Needed to Perform Mud Out Work

Before preparing to depart for the DR area, contact the Command Center and find out what type of work that you will be doing. The following is a list of material/supplies that may be needed to do Mud Out work:

PERSONNEL PROTECTION

Safety Equipment – Wear safety equipment and clothing appropriate to the task.

- Helmet or hard hat
- Goggles
- Dust respirator (N95) or half face respirator with disposable cartridges
- Whistle (for signaling others)

- Work gloves
- Rubber boots
- Heavy duty rubber gloves
- Up to date tetanus shots
- Disposable outer wear (Tyvex coveralls, etc)
- Mosquito repellent that contains at least 33% deet or higher

CLEAN UP EQUIPMENT FOR MUDOUT WORK

- Wheel barrow, one or two wheel
- Garden rakes
- Aluminum scoops
- Flat tipped shovels
- Push brooms
- Buckets
- Mops
- Wash Tubs (for soaking items)
- Squeegees
- Dolly
- Water hose
- Sponge mops
- Hoes
- Bleach and mold treatment
- Containers to mix chemicals in
- Hand sprayers
- Squeegees

HEAVY EQUIPMENT

- Generators
- Pressure Washer
- Fans
- Battery operated tools, i.e. sawsall, drills, etc.

Prior to Beginning the job

1. There are two major health issues in dealing with Mudout situations:
 - a. Contamination from sewage is probable, and
 - b. The presence of “Black Mold”
2. Get information from the Command Center verifying the procedure for sorting material. In some areas, furniture, appliances and building material may need to be separated into different piles for pick up.
3. Contact the home owner and insure that you understand:

- a. If a dumpster is being delivered, or is the material to be placed on the road.
 - i. What is the level that you can fill the dumpster, a rule of thumb is to only fill it $\frac{3}{4}$ of the way. These often have weight limits and also have to be covered prior to removing.
 - b. Ask if you can take pictures.
4. If hazardous material is involved, what is the procedure for handling and for disposal?
5. Locations of the nearest medical center.
6. Contact information for the command center and White Hat. If any questions arise while removing the debris, especially concerning hazardous material, contact the command center.
7. Locate and mark the sewer system, the gas meter, and other utilities that may interfere with disposal activities.

Some generic rules to go by are:

- Place debris on the right –of-way in front of the property in **SEGREGATED** piles.
 - Segregate vegetative debris (trees, limbs, shrubs) from other debris
 - Cut vegetative debris into up to 8 foot pieces
 - Segregate construction and demolition debris (building materials, bricks, etc.) from other debris
 - Segregate furniture from other debris
 - Segregate appliances (refrigerator, washer, etc.) from other debris.
- **DO NOT** place any debris near water, gas, or other meters or near fire hydrants.

Recommended Safety Practices

- Be up to date with immunization: Tetanus, Hepatitis A and B
- Use rubber gloves and safety goggles when handling bleach and other disinfectants
- Wear mask or respirators when spraying chemicals
- Wear disposable coveralls when treating mold
- Disinfect tools at the end of every day
- Because of West Nile Virus, use mosquito repellent with at least 33% DEET level.

Upon arriving at the job site

1. Survey the area and identify:
 - a. Locate areas to place the debris.

- b. If you have owner's approval, take pictures of the area prior to work and after completion.
2. Ensure that every worker has their appropriate safety equipment.
3. Identify the location of the sewer system, the gas meter, any electrical wires, etc that may interfere with the removal process.
4. Before entering the building, evaluate potential safety hazards due to:
 - a. Settled, cracked or undermined foundations
 - b. Weakened structures
 - c. Damaged electrical or gas lines
 - d. Locate the power source and insure that the power is "OFF"
 - e. If there is a basement. If basement is flooded start pumping water in stages (about 1/3 of the water out each day).
5. Do not drink water in an affected area until it is verified to be safe,

Working the job

1. Designate at least one person as a Safety Monitor. Make sure that they have a whistle or some device that can be heard over equipment. They will be responsible for:
 - a. Keeping personnel out of the way of equipment
 - b. Making sure that personnel are wearing their safety gear
 - c. Supplying water and ensuring that personnel stay hydrated.
 - d. Calling for breaks when needed, or making sure that workers take breaks.
 - e. Calling "time out" if hazardous situations occur.
 - f. Making sure that personnel have an area to eat and take breaks that is free from the cleanup zone.
 - g. Conduct safety tool box meetings as directed by the Blue Cap or team leader.
2. Remove hazards that will interfere with doing the work.
3. Seal off non-affected areas to reduce cross contamination.
4. Shovel out mud and silt before it dries, if possible
5. If refrigerators or freezers are still on the site, DO NOT open, tape closed with duct tape.
6. Assist homeowner with removal and salvage of articles (decision for what to keep and throw away belongs to the owner).
7. Use dollies or hand trucks to remove heavy items
8. Items contaminated by sewage should all be discarded.

9. When articles are removed, determine how much wall and floor removal is required, cut walls at least 12 inches above flood level.
10. Pressure wash entire area beginning at the flood level.
11. Use mops, squeegees, etc. to eliminate excess water
12. Disinfect entire area beginning at flood level. Use a garden sprayer to spray mixture on affected areas. Allow area to dry thoroughly before repairs begin.
13. For treatment of items that are removed, i.e. furniture, cloths, dishes, etc., and are to be kept, see attachment II for cleaning suggestions.

To Sanitize: 1 Tbsp bleach to 1 gallon water. This is recommended for dishes and does not need to be rinsed.

To Disinfect Non-Porous Surface: $\frac{3}{4}$ cup bleach to 1 gallon water. Apply with garden sprayer. Let stand 5-10 minutes.

DO NOT sanitize hands or body with a bleach solution.

Use Shock Wave or another type of fungicide to spray for mold, mix 2 oz to 1 gallon of water.

Apply with a garden sprayer.

Closing out the job

Because of limited space, some jobs will take several visits to complete. Make sure each time that you leave a work site that your blue cap or leaderman identifies and notes the status of the job. If the road frontage is narrow, then there will not be enough area to stage all of the material at one time. Whenever you leave the work site, notify the home owner of the status that the site was left. They may need to have dumpsters changed out; metal removed, etc, so that the job can continue at a later time. Have them contact you when the job can continue.

At the end of day

Work should be halted and personnel returned back to their staging area so that cleanup can be done prior to eating the evening meal. If at all possible, do not eat until you have thoroughly cleaned up and soiled cloths have been replaced. You could not only further contaminate yourself, but also the people around you.

ATTACHMENT I

CLEANING BEDDING AND FABRICS THAT HAVE BEEN CONTAMINATED

Cleaners and Disinfectants

- Household cleaners help remove dirt. Disinfectants help stop the growth of disease-causing microorganisms carried in floodwater.
- Powdered or liquid cleaners and disinfectants are more practical and much less expensive than aerosol products, especially since larger areas will need to be cleaned.
- Buy cleaners and disinfectants in largest sizes available to reduce the cost. Farm supply, hardware, wallpaper, and paint stores often have these products in gallon or pound containers.
- All products are not suited for all uses. Before using any cleaner or disinfectant, refer to its label for specific directions or precautions. Make sure the product will do the job you need it to do.
- Many household cleaners and disinfectants are harsh on hands and may burn eyes. Protect your hands by wearing waterproof, rubber gloves. Avoid contact with eyes also. If you splash or spill any product on your skin, wash it off immediately.

Flood Soiled Blanket, Quilts, Comforters, and Linens

NOTE: It is not recommended to clean blankets, quilts or comforters, but if circumstances dictate, wash only one item at a time.

1. Remove surface dirt and follow manufacturer's laundering directions if available. Otherwise proceed as follows;
 - a. Soak at least 15 minutes in lukewarm water. Turn 2-3 times during soak period. There may need to be several soakings to get clean. Change water for each soaking.
 - b. Use mild detergent, disinfectant, and lukewarm water. Immerse blanket and work suds in gently, using as little agitation as possible. Change water and repeat as needed.
 - c. Rinse in several changes of lukewarm water.
 - d. Squeeze out water. Hang blanket over 2 lines to dry, or dry it in a preheated dryer with several large, dry, bath towels. Remove blanket from dryer while it is still damp and hang over the two lines to finish drying. Gently stretch blanket into shape.
 - e. Brush blankets on both sides to raise nap. Steam press binding using synthetic setting. Wash lightweight quilts following directions for wool blankets. Dry outdoors in sunlight, if possible, to remove unpleasant odors. Sunlight kills mold spores.

Electric Blankets:

Follow the manufacturer's laundering directions, if available. Most manufacturers recommend electric blankets be washed, not dry cleaned. Cover plug with heavy cloth and follow directions above. Avoid bending the wiring. Do not put electric blankets through a wringer or dry in a dryer unless manufacturer recommends. To dry, squeeze down blanket lengthwise and hang over two lines.

Sheets, towels, and linens:

1. Brush off as much loose dirt as possible.
2. Rinse mud-stained fabrics in cold water to take out particles of soil lodged in the fibers.
3. Wash in warm suds and disinfect several times if necessary. Do Not use hot water, because it will set red and yellow clay stains.
4. If stains remain after several washings, try bleaching white cottons and linens with chlorine bleach. Do not over bleach. Sun drying will aid bleaching. Bleaches may be used on some colored fabrics. Follow directions on bleach container.

Mattresses: DO NOT ATTEMPT TO CLEAN, DISCARD!

Feather Pillows: DO NOT ATTEMPT TO CLEAN, DISCARD

Upholstered Furniture: DO NOT ATTEMPT TO CLEAN, DISCARD.

CLEANERS AND DISINFECTANTS GENERAL INFORMATION

TYPE OF CLEANER	USES	PRECAUTIONS	ADDITIONAL SUGGESTIONS
Liquid household cleaner (Top Job, Ajax, Mr. Clean)	Wash hard surfaces, such as painted walls, woodwork, porcelain, tile, etc.	Dilute with water as directed on container for specific uses	
Powdered household cleaner	Removes mud, silt, greasy deposits, etc.	Dissolve in water to make a solution	
All-purpose laundry soaps	General household cleaning, hand washing and laundry. Moderately and heavy soiled, washable textiles.	Do not use on wool, silk, or any fabric containing these fibers	Rinse well to remove suds.
Light-duty dishwashing soaps	Lightly soiled washable fabrics and household textiles. Rugs, carpets, appliances and furniture	Safe for wool and silk fibers. Safe for most dyes	Rinse well to remove suds.
Household ammonia	Hard surfaces, windows, woodwork, floors, tile, and porcelain.	Dilute in water. Avoid contact with eyes. May cause skin irritation.	Wear PPE
Tri-sodium phosphates (TSP)	Walls, woodwork, and floors	Dilute in water. Avoid contact with eyes. May cause skin irritation.	Wear PPE
Quaternary disinfectants (Roccal, Zephro)	Laundry-safe for all fibers	May cause some color change	Add at beginning of rinse cycle.
Pine oil disinfectants	Laundry safe for all washable clothing	Do not use on wool or silk. Pine odor will linger on these fabrics.	Add before putting clothes in washer or dilute in 1 qt. of water.
Liquid chlorine disinfectants	Laundry	Do not use on wool, silk, or water-repellent fabrics. Do not use in rinse cycle.	Add bleach before putting clothes in washer or dilute with 1 qt. of water
Phenolic disinfectants	Laundry safe for washables.	Do not use on wool or silk	Add in wash or rinse cycle.

MILDEW REMOVING PRODUCTS

PROBLEM	HOW TO DEAL WITH IT	MATERIALS & TRADE NAMES	PRE-CAUTIONS	ADDITIONAL SUGGESTIONS
Upholstered furniture	Clean off loose dirt. Dry article quickly. Wash surface with cloth dipped in diluted alcohol	Rubbing or denatured alcohol, 1 cup alcohol to 1 cup water	To protect exposed wood, dry in sun for a short time	Dry thoroughly. Use fan and indirect heat.
Rugs	Sponge with suds, wipe with damp cloth, and dry in sun. Spray with disinfectant. Respray often in damp weather.	Lysol, Ocean Spray Pine Oil, Sexton Pine Oil	Wear PPE	Dampen surface with spray
Wood Furniture	Clean while still wet. Wipe off loose dirt. Wash with suds. Wipe with alcohol. Dry away from direct sun and heat. Wait 4 to 6 weeks before refinishing.	Rubbing or denatured alcohol	Do not dry in sun	Dry in warm place with ventilation
Floors and Woodwork	Dry with heat and ventilation. Wipe off loose dirt and mildew. Scrub with solution or washing soda or tri-sodium phosphate. Rinse. Wait 4 to 6 weeks before painting	Washing soad – Arm and Hammer. Tri-Sodium Phosphate. 6 tbsp to 1 gallon of water		May be repainted with mildew resistant paint. This paint contains fungicide, so do not use on children’s cribs, playpens, or toys.
Books	Stand books on end. Spread out pages to dry. Wipe off mildew and loose dirt. After a few hours, stack and press to avoid wrinkling. Alternate opening and stacking until completely dry. Sprinkle talcum powder on pages to absorb moisture.	Moth crystals, Parachloro-benzene	Avoid breathing fumes from moth crystals. Wear PPE.	Books may be frozen until you have time to work with them. Place books in closed container with moth crystals to stop mold growth

FACTS ABOUT FLOOD DAMAGED FURNITURE

Before starting to salvage damaged furniture, decide which pieces are worth restoring. 'These decisions should be based on:

- Extent of damage
- Cost of the article
- Sentimental value
- Cost of restoration.

Consider each piece individually.

- a. Antiques are probably worth the time, effort and expense of restoration.
- b. Solid wood furniture can usually be restored unless damage is severe.
- c. Wood-veneered furniture is usually not worth the cost and effort to repair.
- d. Upholstered furniture may be salvageable depending on its general condition.

Furniture does not need to be repaired immediately. It should be completely dry and cleaned prior to repairing.

CLEANING AND STERILIZING DISHES AND COOKING UTENSILS

Before using any dishes, pots, pans, or cooking utensils that were in contact with floodwater, wash and sterilize them.

Any piece of equipment that can be taken apart should be cleaned in pieces. Remove plastic and wooden handles from all pans. Clean the parts separately.

Wash dishes, pots, and pans, and utensils in hot, sudsy water. Use a brush. If cupboards and food preparation surfaces were in contact with floodwater, clean and sterilize then before sorting dishes and utensils.

FLOODED TILE, LINOLEUM, AND VINYL COVERINGS

Subfloor

Water coming up from below will cause most damage to subfloor material. If a linoleum or vinyl floor covering is not under water for many days, the floor covering may partially protect the subfloor material. However, long submersion will loosen adhesives and warp subflooring. If a plywood or hardwood subfloor is wet, you should probably remove the linoleum or vinyl floor covering and remove the subfloor material.

NOTE: If the subfloor is particle board, when it goes underwater, the glue is dissolved and the boards swell. They then deteriorate. Replacement is the only choice for rebuilding. If the flooring is in a mobil home, the repair cost may not be feasible.

Removing Loosened Floor Coverings

Water may have seeped under the vinyl or sheet linoleum. Most vinyl or sheet linoleum will be destroyed when trying to remove it and is not salvageable. A flat scrapper to remove the flooring is the most efficient way to remove it and then discard. The subfloor will need to dry out for several weeks before it will be it can be recovered.

CLEANING HOUSEHOLD METALS

Rust causes most damage to flooded household metals, especially iron. Use the following treatment to minimize rusting.

Iron Pots, Pans, and Utensils

1. Wash with soap and water using a stiff brush and scouring powder.
2. If rust remains, wipe with a kerosene saturated cloth or use a commercial rust remover.
3. Remove rust from kitchen utensils by scouring with steel wool
4. Season iron pans and utensils with unsalted cooking oil after they have been cleaned and sterilized and dried over heat. Rub with oil and heat in a 250 degree oven for 2 – 3 hours. This will permit the oil to soak into the pores of the metal.

Iron Hardware

1. Coat iron hardware with petrolatum or machine oil to prevent further rusting.
2. Use stove polish on stoves or similar ironwork.

Locks and Hinges

Locks and hinges, especially those made of iron, should be taken apart, wiped with kerosene and oiled. Follow the same procedure for iron hardware. If it isn't possible to remove locks or hinges, squirt machine oil into the bolt opening or keyhole. Work the knobs to distribute the oil. This will help prevent rusting of the springs and metal casing.

Stainless Steel, Nickel-Copper Alloy, Nickel, or Chrome-Plated Metals

1. Wash thoroughly and polish with a fine-powdered cleaner.
2. If furniture plating or hardware is broken so that the base metal is exposed and rusted, wipe with kerosene. Then wash and dry the surface. Wax to prevent any further rusting.

Aluminum Pans and Utensils

1. Wash thoroughly with hot, sudsy water. Scour any unpolished surfaces, such as the insides of the pans with soap filled metal scouring pads. Rinse and dry.
2. Polish plated aluminum surfaces with a fine cleansing powder or silver polish. Do not scour.
3. Sterilize in a chlorine solution.

4. To remove dark stains from aluminum pans, fill pan with water. Add 1 tbsp vinegar or 1 tsp cream of tartar for each quart of water. Boil 10 to 15 minutes. Scour with a soap filled pad, rinse, and dry.
5. If cooking utensils are darkened on the inside and outside, prepare an acid solution (vinegar or cream of tartar) in large container and immerse utensils in it. Boil 10 to 15 minutes, scour with a soap filled pad, rinse and dry.

Copper

1. Polish with a special polish or rub with a cloth saturated with vinegar or a piece of salted lemon.
2. Wash lacquered copper quickly with warm, sudsy water. Do not soak.

BLACK MOLD INFORMATION

THE FOLLOWING INFORMATION COMES FROM THE CENTER FOR DISEASE CONTROL (CDC). <http://www.bt.cdc.gov/disasters/floods/>

Black mold

Stachybotrys is a genus of molds, or asexually-reproducing, filamentous fungi. Closely related to the genus *Memmoniella*, most *Stachybotrys* species inhabit materials rich in cellulose. The genus has a widespread distribution, and contains about 50 species.

The most infamous species, *S. chartarum* (also known as *S. atra*) and *S. chlorohalonata* are known as "**black mold**" or "toxic black mold" in the U.S. and are frequently associated with poor indoor air quality that arises after fungal growth on water-damaged building materials.

Symptoms of *Stachybotrys* exposure in humans

Exposure to the mycotoxins present in *Stachybotrys chartarum* or *Stachybotrys atra* can have a wide range of effects. Depending on the length of exposure and volume of spores inhaled or ingested, symptoms can manifest as chronic fatigue or headaches, fever, irritation to the eyes, mucous membranes of the mouth, nose and throat, sneezing, rashes, and chronic coughing. In severe cases of exposure or cases exacerbated by allergic reaction, symptoms can be extreme including nausea, vomiting, and bleeding in the lungs and nose. The controversy began in the early 1990's after analysis of two infantile deaths due to pulmonary hemorrhage in Cleveland, Ohio were initially linked to exposure to heavy amounts of *Stachybotrys chartarum*. Subsequent and extensive reanalysis of the cases by the United States Centers for Disease Control and Prevention have failed to find any link between the deaths and the mold exposure.^[6]

Protect Yourself from Mold

After natural disasters such as hurricanes, tornadoes, and floods, excess moisture and standing water contribute to the growth of mold in homes and other buildings. When returning to a home that has been flooded, be aware that mold may be present and may be a health risk for your family.

People at Greatest Risk from Mold

People with asthma, allergies, or other breathing conditions may be more sensitive to mold. People with immune suppression (such as people with HIV infection, cancer patients taking chemotherapy, and people who have received an organ transplant) are more susceptible to mold infections.

Possible Health Effects of Mold Exposure

People who are sensitive to mold may experience stuffy nose, irritated eyes, wheezing, or skin irritation. People allergic to mold may have difficulty in breathing and shortness of breath. People with weakened immune systems and with chronic lung diseases, such as obstructive lung disease, may develop mold infections in their lungs. If you or your family members have health problems after exposure to mold, contact your doctor or other health care provider.

Recognizing Mold

You may recognize mold by:

- **Sight** (Are the walls and ceiling discolored, or do they show signs of mold growth or water damage?)
- **Smell** (Do you smell a bad odor, such as a musty, earthy smell or a foul stench?)

If you choose to use bleach to remove mold:

- Never mix bleach with ammonia or other household cleaners. Mixing bleach with ammonia or other cleaning products will produce dangerous, toxic fumes
- Open windows and doors to provide fresh air.
- Wear non-porous gloves and protective eye wear.
- If the area to be cleaned is more than 10 square feet, consult the U.S. Environmental Protection Agency (EPA) guide titled *Mold Remediation in Schools and Commercial Buildings* . Although focused on schools and commercial buildings, this document also applies to other building types. You can get it free by calling the EPA Indoor Air Quality

Information Clearinghouse at (800) 438-4318 [begin_of_the_skype_highlighting](#) (800)

438-4318 FREE end_of_the_skype_highlighting, or by going to the EPA web site at http://www.epa.gov/mold/mold_remediation.html .

- Always follow the manufacturer's instructions when using bleach or any other cleaning product.
- More information on personal safety while cleaning up after a natural disaster is available at emergency.cdc.gov/disasters/workers.asp.

If you plan to be inside the building for a while or you plan to clean up mold, you should buy an N95 mask at your local home supply store and wear it while in the building. Make certain that you follow instructions on the package for fitting the mask tightly to your face. If you go back into the building for a short time and are not cleaning up mold, you do not need to wear an N95 mask.

Inside the Home

- Keep children and pets out of the affected area until cleanup has been completed.
- Wear rubber boots, rubber gloves, and goggles during cleanup of affected area.
- Remove and discard items that cannot be washed and disinfected (such as, mattresses, carpeting, carpet padding, rugs, upholstered furniture, cosmetics, stuffed animals, baby toys, pillows, foam-rubber items, books, wall coverings, and most paper products).
- Remove and discard drywall and insulation that has been contaminated with sewage or flood waters.
- Thoroughly clean all hard surfaces (such as flooring, concrete, molding, wood and metal furniture, countertops, appliances, sinks, and other plumbing fixtures) with hot water and laundry or dish detergent.
- Help the drying process by using fans, air conditioning units, and dehumidifiers.
- After completing the cleanup, wash your hands with soap and warm water. Use water that has been boiled for 1 minute (allow the water to cool before washing your hands).
 - Or you may use water that has been disinfected for personal hygiene use (solution of 1/8 teaspoon [~ 0.75 milliliters] of household bleach per 1 gallon of water). Let it stand for 30 minutes. If the water is cloudy, use a solution of 1/4 teaspoon (~ 1.5 milliliters) of household bleach per 1 gallon of water.
- Wash all clothes worn during the cleanup in hot water and detergent. These clothes should be washed separately from uncontaminated clothes and linens.
- Wash clothes contaminated with flood or sewage water in hot water and detergent. It is recommended that a laundromat be used for washing large quantities of clothes and linens until your onsite waste-water system has been professionally inspected and serviced.
- Seek immediate medical attention if you become injured or ill.

Outside the Home

- Keep children and pets out of the affected area until cleanup has been completed.
- Wear rubber boots, rubber gloves, and goggles during cleanup of affected area.
- Have your onsite waste-water system professionally inspected and serviced if you suspect damage.

- Wash all clothes worn during the cleanup in hot water and detergent. These clothes should be washed separately from uncontaminated clothes and linens.
- After completing the cleanup, wash your hands with soap and warm water. Use water that has been boiled for 1 minute (allow the water to cool before washing your hands).
 - Or you may use water that has been disinfected for personal hygiene use (solution of ½ teaspoon [~0.75 milliliters] of household bleach per 1 gallon of water). Let it stand for 30 minutes. If the water is cloudy, use solution of ¼ teaspoon (~1.5 milliliters) of household bleach per 1 gallon of water.
- Seek immediate medical attention if you become injured or ill.

Health Risks

Flood waters and standing waters pose various risks, including infectious diseases, chemical hazards, and injuries.

Infectious Diseases

Diarrheal Diseases

Eating or drinking anything contaminated by flood water can cause diarrheal disease. To protect yourself and your family:

- Practice good hygiene ([handwashing](#)) after contact with flood waters.
- Do not allow children to play in flood water areas.
- Wash children's hands frequently (always before meals).
- Do not allow children to play with toys that have been contaminated by flood water and have not been disinfected.
- For information on disinfecting certain nonporous toys, visit CDC Healthy Water's [Cleaning and Sanitizing with Bleach](#) section.

Wound Infections

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.

Chemical Hazards

Be aware of potential chemical hazards during floods. Flood waters may have moved hazardous chemical containers of solvents or other industrial chemicals from their normal storage places.

Injuries

Drowning

Flood water poses drowning risks for everyone, regardless of their ability to swim. Swiftly moving shallow water can be deadly, and even shallow standing water can be dangerous for small children.

Vehicles do not provide adequate protection from flood waters. They can be swept away or may stall in moving water.

Animal and Insect Bites

Flood waters can displace animals, insects, and reptiles. To protect yourself and your family, be alert and avoid contact.

Electrical Hazards

Avoid downed power lines.

Wounds


Flood waters may contain sharp objects, such as glass or metal fragments, that can cause injury and lead to infection.

Questions about Mold.

I heard about "toxic molds" that grow in homes and other buildings. Should I be concerned about a serious health risk to me and my family?

The term "toxic mold" is not accurate. While certain molds are toxigenic, meaning they can produce toxins (specifically mycotoxins), the molds themselves are not toxic, or poisonous. Hazards presented by molds that may produce mycotoxins should be considered the same as other common molds which can grow in your house. There is always a little mold everywhere - in the air and on many surfaces. There are very few reports that toxigenic molds found inside homes can cause unique or rare health conditions such as pulmonary hemorrhage or memory loss. These case reports are rare, and a causal link between the presence of the toxigenic mold and these conditions has not been proven.

In 2004 the Institute of Medicine (IOM) found there was sufficient evidence to link indoor exposure to mold with upper respiratory tract symptoms, cough, and wheeze in otherwise healthy people; with asthma symptoms in people with asthma; and with hypersensitivity pneumonitis in individuals susceptible to that immune-mediated condition. The IOM also found limited or suggestive evidence linking indoor mold exposure and respiratory illness in otherwise healthy children. In 2009, the World Health Organization issued additional guidance, the WHO Guidelines

for Indoor Air Quality: Dampness and Mould  [PDF, 2.52 MB]. Other recent studies have suggested a potential link of early mold exposure to development of asthma in some children, particularly among children who may be genetically susceptible to asthma development, and that selected interventions that improve housing conditions can reduce morbidity from asthma and respiratory allergies, but more research is needed in this regard.

A common-sense approach should be used for any mold contamination existing inside buildings and homes. The common health concerns from molds include hay fever-like allergic symptoms. Certain individuals with chronic respiratory disease (chronic obstructive pulmonary disorder, asthma) may experience difficulty breathing. Individuals with immune suppression may be at increased risk for infection from molds. If you or your family members have these conditions, a qualified medical clinician should be consulted for diagnosis and treatment. For the most part, one should take routine measures to prevent mold growth in the home.

top

How common is mold, including *Stachybotrys chartarum* (also known by its synonym *Stachybotrys atra*) in buildings?

Molds are very common in buildings and homes and will grow anywhere indoors where there is moisture. The most common indoor molds are *Cladosporium*, *Penicillium*, *Aspergillus*, and *Alternaria*. We do not have precise information about how often *Stachybotrys chartarum* is found in buildings and homes. While it is less common than other mold species, it is not rare.

How do molds get in the indoor environment and how do they grow?

Mold spores occur in the indoor and outdoor environments. Mold spores may enter your house from the outside through open doorways, windows, and heating, ventilation, and air conditioning systems with outdoor air intakes. Spores in the air outside also attach themselves to people and animals, making clothing, shoes, bags, and pets convenient vehicles for carrying mold indoors.

When mold spores drop on places where there is excessive moisture, such as where leakage may have occurred in roofs, pipes, walls, plant pots, or where there has been flooding, they will grow. Many building materials provide suitable nutrients that encourage mold to grow. Wet cellulose materials, including paper and paper products, cardboard, ceiling tiles, wood, and wood products, are particularly conducive for the growth of some molds. Other materials such as dust, paints, wallpaper, insulation materials, drywall, carpet, fabric, and upholstery, commonly support mold growth.

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What is *Stachybotrys chartarum* (*Stachybotrys atra*)?

Stachybotrys chartarum (also known by its synonym *Stachybotrys atra*) is a greenish-black mold. It can grow on material with a high cellulose and low nitrogen content, such as fiberboard, gypsum board, paper, dust, and lint. Growth occurs when there is moisture from water damage,

excessive humidity, water leaks, condensation, water infiltration, or flooding. Constant moisture is required for its growth. It is not necessary, however, to determine what type of mold you may have. All molds should be treated the same with respect to potential health risks and removal.

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Are there any circumstances where people should vacate a home or other building because of mold?

These decisions have to be made individually. If you believe you are ill because of exposure to mold in a building, you should consult your physician to determine the appropriate action to take.

Who are the people who are most at risk for health problems associated with exposure to mold?

People with allergies may be more sensitive to molds. People with immune suppression or underlying lung disease are more susceptible to fungal infections.

What are the potential health effects of mold in buildings and homes?

Mold exposure does not always present a health problem indoors. However some people are sensitive to molds. These people may experience symptoms such as nasal stuffiness, eye irritation, wheezing, or skin irritation when exposed to molds. Some people may have more severe reactions to molds. Severe reactions may occur among workers exposed to large amounts of molds in occupational settings, such as farmers working around moldy hay. Severe reactions may include fever and shortness of breath. Immunocompromised persons and persons with chronic lung diseases like COPD are at increased risk for opportunistic infections and may develop fungal infections in their lungs.

In 2004 the Institute of Medicine (IOM) found there was sufficient evidence to link indoor exposure to mold with upper respiratory tract symptoms, cough, and wheeze in otherwise healthy people; with asthma symptoms in people with asthma; and with hypersensitivity pneumonitis in individuals susceptible to that immune-mediated condition. The IOM also found limited or suggestive evidence linking indoor mold exposure and respiratory illness in otherwise healthy children.

How do you get the molds out of buildings, including homes, schools, and places of employment?

In most cases mold can be removed from hard surfaces by a thorough cleaning with commercial products, soap and water, or a bleach solution of no more than 1 cup of bleach in 1 gallon of water. Absorbent or porous materials like ceiling tiles, drywall, and carpet may have to be thrown away if they become moldy. If you have an extensive amount of mold and you do not think you can manage the cleanup on your own, you may want to contact a professional who has experience in cleaning mold in buildings and homes. It is important to properly clean and dry the area as you

can still have an allergic reaction to parts of the dead mold and mold contamination may recur if there is still a source of moisture.

If you choose to use bleach to clean up mold:

- Never mix bleach with ammonia or other household cleaners. Mixing bleach with ammonia or other cleaning products will produce dangerous, toxic fumes.
- Open windows and doors to provide fresh air.
- Wear non-porous gloves and protective eye wear.
- If the area to be cleaned is more than 10 square feet, consult the U.S. Environmental Protection Agency (EPA) guide titled *Mold Remediation in Schools and Commercial Buildings*. Although focused on schools and commercial buildings, this document also applies to other building types. You can get it by going to the EPA web site at http://www.epa.gov/mold/mold_remediation.html.
- Always follow the manufacturer's instructions when using bleach or any other cleaning product.

What should people do if they determine they have *Stachybotrys chartarum* (*Stachybotrys atra*) in their buildings or homes?

Mold growing in homes and buildings, whether it is *Stachybotrys chartarum* (*Stachybotrys atra*) or other molds, indicates that there is a problem with water or moisture. This is the first problem that needs to be addressed. Mold growth can be removed from hard surfaces with commercial products, soap and water, or a bleach solution of no more than 1 cup of bleach in 1 gallon of water. Mold in or under carpets typically requires that the carpets be removed. Once mold starts to grow in insulation or wallboard, the only way to deal with the problem is by removal and replacement. We do not believe that one needs to take any different precautions with *Stachybotrys chartarum* (*Stachybotrys atra*), than with other molds. In areas where flooding has occurred, prompt drying out of materials and cleaning of walls and other flood-damaged items with commercial products, soap and water, or a bleach solution of no more than 1 cup of bleach in 1 gallon of water is necessary to prevent mold growth. Never mix bleach with ammonia or other household cleaners. If a home has been flooded, it also may be contaminated with sewage. (See: *After a Hurricane or Flood: Cleanup of Flood Water*) Moldy items should be removed from living areas.

Flood Water After a Disaster or Emergency

When returning to your home after a hurricane or flood, be aware that flood water may contain sewage. Protect yourself and your family by following these steps:

Inside the Home

- Keep children and pets out of the affected area until cleanup has been completed.
- Wear rubber boots, rubber gloves, and goggles during cleanup of affected area.
- Remove and discard items that cannot be washed and disinfected (such as, mattresses, carpeting, carpet padding, rugs, upholstered furniture, cosmetics, stuffed animals, baby toys, pillows, foam-rubber items, books, wall coverings, and most paper products).

- Remove and discard drywall and insulation that has been contaminated with sewage or flood waters.
- Thoroughly clean all hard surfaces (such as flooring, concrete, molding, wood and metal furniture, countertops, appliances, sinks, and other plumbing fixtures) with hot water and laundry or dish detergent.
- Help the drying process by using fans, air conditioning units, and dehumidifiers.
- After completing the cleanup, wash your hands with soap and warm water. Use water that has been boiled for 1 minute (allow the water to cool before washing your hands).
 - Or you may use water that has been disinfected for personal hygiene use (solution of $\frac{1}{8}$ teaspoon [~ 0.75 milliliters] of household bleach per 1 gallon of water). Let it stand for 30 minutes. If the water is cloudy, use a solution of $\frac{1}{4}$ teaspoon (~ 1.5 milliliters) of household bleach per 1 gallon of water.
- Wash all clothes worn during the cleanup in hot water and detergent. These clothes should be washed separately from uncontaminated clothes and linens.
- Wash clothes contaminated with flood or sewage water in hot water and detergent. It is recommended that a laundromat be used for washing large quantities of clothes and linens until your onsite waste-water system has been professionally inspected and serviced.
- Seek immediate medical attention if you become injured or ill.

See also Reentering Your Flooded Home , Mold After a Disaster , and Cleaning and Sanitizing With Bleach after an Emergency .

Outside the Home

- Keep children and pets out of the affected area until cleanup has been completed.
- Wear rubber boots, rubber gloves, and goggles during cleanup of affected area.
- Have your onsite waste-water system professionally inspected and serviced if you suspect damage.
- Wash all clothes worn during the cleanup in hot water and detergent. These clothes should be washed separately from uncontaminated clothes and linens.
- After completing the cleanup, wash your hands with soap and warm water. Use water that has been boiled for 1 minute (allow the water to cool before washing your hands).
 - Or you may use water that has been disinfected for personal hygiene use (solution of $\frac{1}{8}$ teaspoon [~ 0.75 milliliters] of household bleach per 1 gallon of water). Let it stand for 30 minutes. If the water is cloudy, use solution of $\frac{1}{4}$ teaspoon (~ 1.5 milliliters) of household bleach per 1 gallon of water.
- Seek immediate medical attention if you become injured or ill.

Health Risks

Flood waters and standing waters pose various risks, including infectious diseases, chemical hazards, and injuries.

Infectious Diseases

Diarrheal Diseases

Eating or drinking anything contaminated by flood water can cause diarrheal disease. To protect yourself and your family:

- Practice good hygiene (handwashing) after contact with flood waters.
- Do not allow children to play in flood water areas.
- Wash children's hands frequently (always before meals).
- Do not allow children to play with toys that have been contaminated by flood water and have not been disinfected.
- For information on disinfecting certain nonporous toys, visit CDC Healthy Water's Cleaning and Sanitizing with Bleach section.

Wound Infections

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 [Emergency Wound Care After a Natural Disaster](#) .

Chemical Hazards

Be aware of potential chemical hazards during floods. Flood waters may have moved hazardous chemical containers of solvents or other industrial chemicals from their normal storage places.

- [Protect Yourself From Chemicals Released During a Natural Disaster](#)
- [Chemical Emergencies](#)

Injuries

Drowning

Flood water poses drowning risks for everyone, regardless of their ability to swim. Swiftly moving shallow water can be deadly, and even shallow standing water can be dangerous for small children.

Vehicles do not provide adequate protection from flood waters. They can be swept away or may stall in moving water.

Animal and Insect Bites

Flood waters can displace animals, insects, and reptiles. To protect yourself and your family, be alert and avoid contact.

- Protect Yourself from Animal- and Insect-Related Hazards After a Disaster
- Wildlife in Disasters [FEMA] [🔗](#)

Electrical Hazards

Avoid downed power lines.

- Protect Yourself and Others From Electrical Hazards After a Disaster

Wounds

Flood waters may contain sharp objects, such as glass or metal fragments, that can cause injury and lead to infection.

- Emergency Wound Care After a Natural Disaster

Resources and Guidance

- After a Flood
- Floods [FEMA] [🔗](#)
- Prevent Illness and Injuries After a Hurricane or Flood

I found mold growing in my home; how do I test the mold?

Generally, it is not necessary to identify the species of mold growing in a residence, and CDC does not recommend routine sampling for molds. Current evidence indicates that allergies are the type of diseases most often associated with molds. Since the reaction of individuals can vary greatly either because of the person's susceptibility or type and amount of mold present, sampling and culturing are not reliable in determining your health risk. If you are susceptible to mold and mold is seen or smelled, there is a potential health risk; therefore, no matter what type of mold is present, you should arrange for its removal. Furthermore, reliable sampling for mold can be expensive, and standards for judging what is and what is not an acceptable or tolerable quantity of mold have not been established.

Summary

In summary, *Stachybotrys chartarum* (*Stachybotrys atra*) and other molds may cause health symptoms that are nonspecific. At present there is no test that proves an association between *Stachybotrys chartarum* (*Stachybotrys atra*) and particular health symptoms. Individuals with persistent symptoms should see their physician. However, if *Stachybotrys chartarum*

(*Stachybotrys atra*) or other molds are found in a building, prudent practice recommends that they be removed.