Creating A Healthy Home

A FIELD GUIDE FOR CLEAN-UP OF FLOODED HOMES

About This Edition of the Guide

This guide was originally created to help with the rebuilding of Gulf Coast homes and communities damaged by Hurricanes Katrina and Rita. It was reprinted in June 2008 for the flooded areas of the Midwest.

Acknowledgements

Between October 2005 and March 2006, three national housing organizations–Enterprise Community Partners, the National Center for Healthy Housing and NeighborWorks® America–teamed up with Neighborhood Housing Services of New Orleans to investigate how to safely and affordably decontaminate flooded homes in the Gulf Coast region post-Hurricanes Katrina and Rita. Funding was provided by the Robert Wood Johnson Foundation. These organizations wish to thank the four homeowners who volunteered their homes for this work.

We also acknowledge the important contributions of:

- Researchers at the Mailman School of Public Health at Columbia University and the Center for Applied Environmental Public Health at Tulane University for their scientific support with mold sample collection and documentation of the effectiveness of the work.
- Little Sisters of the Assumption Family Health Services, Inc. and Microecologies, Inc. for the invaluable advice that is included in this document, which they obtained from their own clean-up demonstration project in New Orleans. A copy of the flood clean-up DVD, "Mold Clean-up Guidance for New Orleans Area Residents Affected by Hurricane Katrina," co-produced by these partners and the National Center for Healthy Housing (NCHH) is available by contacting NCHH.
- URC, Inc. for assisting with the development of the clean-up specifications, the oversight of the clean-up work, and general expertise in housing rehabilitation.
- Community Resources for creating the fine illustrations in this document and assisting with its content.

Disclaimer

The information contained in this field guide was compiled to serve as a general informational guide for flood clean-up and is not intended to address specific conditions that may be present at individual properties or to replace the services of a professional. Persons who believe that their premises may contain mold, sewage effluent or hazardous materials should consult professional consultants.

As each reader's circumstances vary, you, our reader, understand that this field guide is solely for informational purposes. The advice offered in this field guide addresses some of the more general hazards resulting from mold. In no event shall any party that has contributed to this field guide, its underwriter, or any other party be liable for damages of any nature (including, without limitation, incidental and consequential damages, personal injury/wrongful death) resulting from the use of or inability to use this field guide.

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Who Should Use This Guide?

This guide is meant for do-it-yourselfers and contractors who need to clean up mold in flooded homes before starting to rebuild or renovate. This booklet tells how to clean up after flooding, but does not describe how to rebuild.

What Can You Do Yourself and When to Hire a Professional

Trained Mold Remediation Professionals:

The U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control and Prevention (CDC) recommend that trained mold remediation professionals do the mold clean up **if mold growth covers more than 100 square feet, or a 10 foot by 10 foot area.**

Here are tips for hiring mold remediation professionals:

- Know the rules of your state about using licensed mold remediation professionals. Some states require licensing. Do not hire unlicensed professionals in those states.
- **Do not hire** contractors who recommend fogging or spraying as the way to clean up. Moldy materials must be removed from the building.
- If possible, get quotes from more than one company.
- Ask each contractor to give references on similar jobs and check to see if the references were satisfied with the jobs done.
- Require each contractor to give a written estimate that includes:
  - A detailed scope of work.
  - A detailed plan for how you and other residents, your belongings and the workers themselves will be protected during the work.
  - An agreement that you will hold the final payment until the work passes an inspection by a professional. The inspection should show there was no visible mold, no mold odors and that air tested after the work was done has a safe level of indoor air quality.
- To get the most protection for the work, ask the contractor to give proof that the contractor has commercial general liability, contractual liability and pollution (mold) liability insurance.
- Use a highly qualified person for the final inspection and testing. In some states, that person must not work for the mold remediation contractor and must give a written report of the inspection findings. This report lets you know that it is safe to rebuild. You should also save this report and show it to prospective buyers when you sell or rent your home.

Other Professionals:

Asbestos must be removed by a certified professional. In most states, contractors who apply borate solutions, like Termite Prufe® or Bora-Care®, for pest control purposes need to be licensed pest control operators.

Residents and Volunteers:

In emergencies and special situations, residents and volunteers may do mold clean-up work that would normally be done by trained mold remediation professionals. No matter who does the mold clean-up work, **be sure to wear the necessary personal protective equipment and follow the work practices and procedures described in this guide for a safe and effective mold clean-up.**

People with asthma, mold allergies or other respiratory conditions, people with weakened immune systems, children and pregnant women SHOULD NOT do this work and MUST remain out of these homes until the work is complete. They are especially vulnerable to the hazards found in flooded homes.

What are the Major Health Risks When Working on Water-Damaged Homes?

Structural Problems

If the building has been pushed off its foundation, DO NOT enter it yourself. Only trained construction professionals should work in these dangerous conditions.

- If you plan to enter a house that has been under water for a long time or has remained wet, be sure that the floor has not rotted through. Test for rotten areas by hitting the floorboards with the end of a 2" x 4" piece of lumber.

Mold

What are the health effects associated with exposure to mold?

People most often are exposed to mold by breathing in mold spores that float in the air. These mold spores are too small to be seen with the naked eye. When people with mold allergies breathe air that has high mold levels, they can have allergy symptoms such as stuffy nose, sinus problems and shortness of breath. Even worse, they may have a life-threatening asthma attack.

What are the symptoms?

Get medical attention if you have the following symptoms:

- Breathing difficulties or shortness of breath
- Wheezing
- Sore throat
- Flu-like aches and pains
- Fatigue (tired for a long time)

Lead Dust

Many homes built before 1978 have paint that contains lead. As the building dries and paint flakes and peels from the walls, lead dust can be a danger to people who do the clean-up. Demolition and renovation can make large amounts of dust that people in the home or workers can breathe in or get on their clothes, hands or food. By the time a person shows symptoms, the lead poisoning has already happened.

What are the symptoms?
Lead poisoning often shows no symptoms at all. Signs and symptoms of lead poisoning *in adults* may include:

- Pain, numbness or tingling of the hands and feet
- High blood pressure
- Muscle weakness
- Headache
- Abdominal pain
- Memory loss
- Sexual difficulties in men
- Problems during pregnancy

Carbon Monoxide

Carbon monoxide (CO) is an odorless, colorless gas that can cause sudden illness and death. Burning fuels, such as gas, oil, kerosene, wood or charcoal, produce CO. No fuel burning equipment, including portable generators, should be used inside flood damaged homes.

Cuts and Punctures

Broken glass, boards, exposed nails and other hazards are common in flood and storm damaged homes. Floodwaters may contain germs or viruses that can enter the skin through cuts and scrapes.

- Wear protective equipment to prevent serious injuries. Take special care to protect hands and feet.
- Check that you and your workers have current tetanus shots (within the last 10 years) before working in flooded areas.
- If a cut or puncture occurs, wash the cut immediately and treat with an antiseptic ointment such as Betadine or Povidine Iodine Cream.

Electric Shocks

Electric shocks can kill. There is a danger of electrical shock from any electrical device that has been flooded. Rubber boots and gloves do not always protect from electric shock.

Turn off the electricity at the breaker before starting work if you do not know the condition of the wiring behind walls

How to Protect Yourself from Environmental Health and Safety Threats

Lungs (Respiratory System)

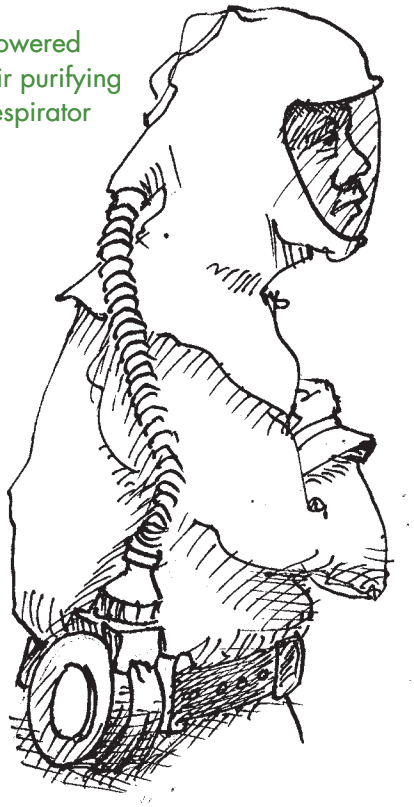
Unless you wear a respirator, you are at high risk of breathing allergens and toxins from mold, lead dust and other construction dust.

RESPIRATORY PROTECTION OPTIONS

N95 or N100 paper or cloth

Half-face negative-air respirator

Powered air purifying respirator



- For most flood clean-up work, use a half-face negative-air respirator with HEPA filters. These respirators have canisters on the sides of your mouth to filter out dust and mold. HEPA filters are magenta colored.
- Use paper or cloth respirators labeled N95 or N100 if you plan to be in the home for short periods of time (less than 15 minutes) and will not disturb much mold. The best N95/N100 dust filters have a valve in the middle and two straps to hold the mask securely on the head.
- If you plan to work in many houses with high mold and dust levels, you may want to buy a powered air purifying respirator (PAPR) that has a fan that blows filtered air into the hood. These are especially helpful if you have a beard and cannot get a tight fit from other respirators or masks. PAPR's provide the highest level of protection, but at a cost over $500 are hard for most homeowners to afford.
- Follow the instructions supplied with the respirator or mask carefully. Respirators and masks must fit right to work correctly. Contractors must follow the rules for an OSHA respirator program.

Eyes

- Wear goggles, safety glasses with side shields or full-face shield. Sun/glare-protective lenses may be needed in some work settings.
- Wear a cap with a brim to prevent dust from falling behind the glasses.
- Always keep a bottle of eyewash solution (available at drugstores) on the job in case you get something in your eye.

Ears

- Use earplugs/earmuffs in high noise work areas where chainsaws or heavy equipment are used. At most clean-up sites, the earplugs are not needed.

Feet

- Wear work boots with steel shank, toe and insole.
- DO NOT wear tennis shoes or sneakers because they will not prevent punctures, bites or crush injuries.

Head

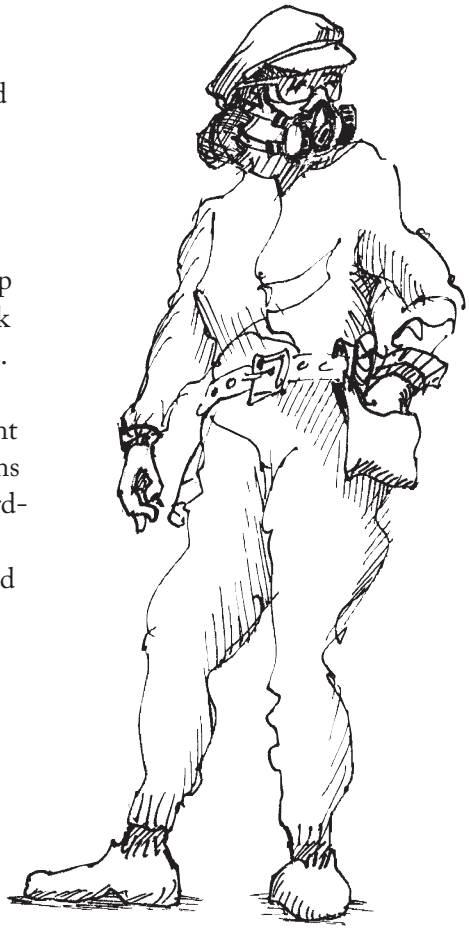
- Wear coveralls with a hood, a soft hat with a brim or other protective head cover. Wear an American National Standards Institute (ANSI)-rated hardhat if there is any danger of falling debris or electrical hazards.

Hands

- Use heavy, waterproof, cut-resistant gloves.
- Also always wash your hands and face before eating, drinking, smoking or putting on sun screen or lip protection to limit how much mold and dust gets into your body.

Protecting the People You Go Home To

- The hazards you face when cleaning up a flooded home, such a mold spores, contaminants from flood waters and lead dust, can stay on shoes, clothes and equipment after you leave the work site.
- Wear disposable coveralls and boot covers to stop the spread of dust, toxics or germs from the work area to other clean areas or your home or vehicle. Remove and throw away after use.
- Clean reusable protective clothing and equipment by following the manufacturer's recommendations for exposure to mold and other potentially hazardous chemicals.
- Wash all nondisposable clothing in hot water and detergent separately from other clothes.



These icons are used throughout this publication to indicate levels of protection required.

Wear at least a cap, safety glasses and an N95 or N100 respirator

Wear at least a cap, safety glasses, and half-face negative air respirator

Also wear a hard hat

Also wear rubber boots and water resistant gloves

1. PRE WORK INSPECTION

Open doors and windows for 30 minutes before working in the home to reduce odor levels and allow for dilution of airborne contaminants.

Basic Safety Inspection

Is there structural damage?

- If YES, do not enter the home until a professional has inspected it and determined it is safe.

Has your electrical system been inspected?

- If NO, have an electrician or the utility company inspect your service before using it. Make sure the main electrical switch is turned off. DO NOT enter an area of the home that has standing water until the power has been shut off.
- If YES, but is not rated safe, DO NOT use the system. Plan on renting or buying a generator for clean-up work. Do not use open flames for lighting or heat.

Has the natural gas system been inspected?

- If NO, have the utility company inspect your service before using it. Make sure the gas line entering the home is turned off.

Do you smell natural gas?

- If YES, call the local gas company or 911 immediately.

Are water pipes, faucets, sinks and tubs free of holes, cracks or leaks?

- If NO, turn off the water that leads to the pipe/fixture to stop water leaks and further moisture damage. Plan on having a plumber repair the damage.
- If YES, do not drink or use water for cooking, washing food or bathing until the water utility or public health department says that it is safe to use.

Are the toilets and sewer pipes free of holes, cracks or leaks? Do they drain well?

- If NO, do not use plumbing until a plumber has fixed the pipe.

Was the heating and air conditioning system flooded or are there signs of mold?

- If YES, do not use system until clean-up is complete and a HVAC (Heating, Ventilation and Air Conditioning) professional can inspect and either clean the system or replace it.

Flood/Storm Damage Inspection

Is there an active roof leak or other damage to the house that would let water in?

- If YES, cover the roof or other damaged area with a tarp until it can be fixed. There must be a temporary water- and wind-tight roof before beginning storm damage repair.

Contact your insurance company immediately, but do not wait for the claims adjuster to come to the home before removing wet and moldy materials. Take photographs for insurance purposes.

Assume that building interiors are seriously contaminated with mold if:

- The building was under water or was wet for more than 48 hours.
- You see more mold growth than what was present before the flood.
- You see signs of water damage or mold or smell strong mold or mildew odors.

Is there standing water in the home?

- If YES, decide if the water must be pumped out or can be mopped out. Plan to rent or buy a pump if needed. Wear boots before entering water.

Can the flood contamination be limited to certain rooms? For example, did the second floor have no water damage and no signs of mold?

- If YES, then it may be possible to section off areas for use for storage. See Section 3 on Site Preparation for how to section off parts of the home.

How high is the mold or water damage on the walls?

- If less than four feet and the walls are gypsum wallboard (i.e., drywall), it may be cheaper to remove drywall up to the four foot line. See Section 7 on Selective Tear Out of walls for instructions on how to partially remove drywall.

Was the home built before 1978?

- If YES, you should assume it has lead-based paint and should use lead safe work practices when disturbing this paint (see HUD Lead Paint Safety Field Guide: http://www.hud.gov/offices/lead/training/LBPguide.pdf).

Are there 8″ x 8″ or 9″ x 9″ floor tiles in the home? Is there any known asbestos in the home?

- If YES, you should assume rigid floor tiles measuring 8"x 8" or 9"x 9" made before 1970 contain asbestos. Asbestos can cause cancer and other diseases. Spray the tiles with water and then carefully remove. You may also need the help of an asbestos specialist to remove these materials, especially if the asbestos is nonrigid (easily crumbled).

Is there damage to doors, trim, windows? Is there damage to cabinets and cabinet doors? Were the large appliances flooded?

- All of these components can be saved if not badly damaged. In choosing whether to save or replace, think about how much they are now worth and how much it will cost to restore compared to your costs to replace them. If you do not think you can remove all mold and other contaminants from building components and appliances, replacement is a better option. Do not try to preserve pressboard cabinets or hollow-core doors that have mold growth. When appliances are flooded, they can rarely be saved.

Can any of the furnishings and belongings in the home be saved?

- In general, do not try to save moldy, porous items (items that absorb water).
- The following items need to be thrown away when you can see or smell mold and/or the materials have been under water:
  - Carpet, carpet padding and rugs
  - Upholstered furniture
  - Computers, microwaves, window A/C units and other electronics/appliances that had fans and were housed in moldy rooms.
  - Papers and books
  - Food items, including canned foods that were in contact with flood waters.
- Items that can typically be saved include:
  - Nonporous items like china, glass, jewelry, porcelain and metal
  - All-wood furniture with mold growth but otherwise in good condition
  - Some electronics and small appliances (depends on flooding conditions)
  - Photographs, books and valuable or important legal documents with minor levels of mold growth
  - Artwork, textiles, clothing that are not physically damaged

If you plan to save your belongings, think about how much storage space you will need. If they cannot be stored at home, make plans for moving and storage at another location. Clean all personal belongings from mold-contaminated areas before moving them to storage areas. See Section 8 for how to clean belongings.

When deciding whether to save items, remember that it will take a lot of cleaning time to remove mold and flood contamination to make them safe for reuse. For many items without sentimental value, replacement may be better. This is especially true if items are covered by insurance.

Air out building

Before leaving the building after the inspection:

- Open windows as long as the weather is dry.
- Open all the windows on the lower floor that you can safely keep open. Some windows may be able to be left partially open. For safety, fix these openings by putting a screw in the window frame.
- Open interior doors, especially closets and interior rooms, to let air reach all areas of the building. Take interior doors off their hinges if necessary to help the air flow.
- Open the attic windows or skylights, if available, to increase ventilation.
- DO NOT run the central air system.
- If power is on, put a fan in a window to blow mold-filled air to the outdoors. DO NOT use fans if the house is contaminated with sewage because the air movement may spread germs into other parts of the house.

2. BEFORE WORK BEGINS

Purchase and order tools and supplies

Make a list of all supplies that are needed, including personal protective equipment and order them ahead of time. See Appendix 1 for a list of supplies and materials.

Plan for trash removal

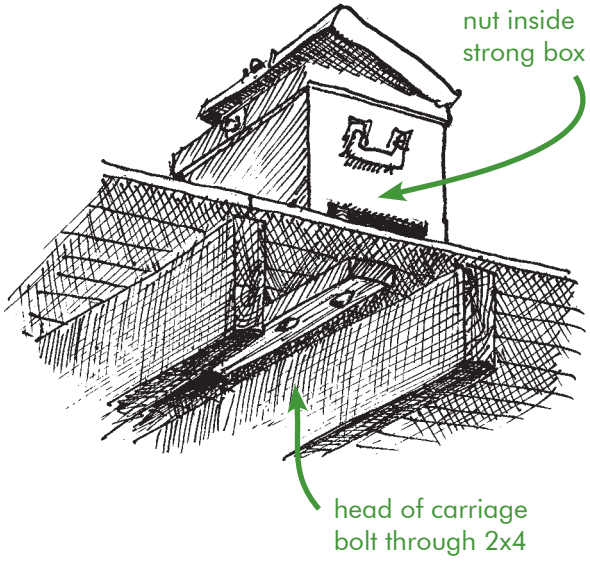
Know how your community is handling the pick-up of flood-damaged debris. If debris left on the curb will not be picked up, make plans to rent a dumpster or have a contractor haul the waste for you.

Set up a storage area for items to be saved

If belongings will be saved, determine how much storage you need for those items. If they cannot be stored at the home, make plans for moving and storage at another location. Personal belongings that come from mold-contaminated areas must be cleaned first.

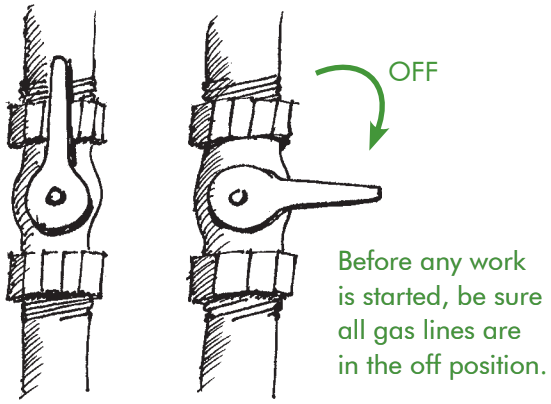
Set up electricity

Set up portable generators outside the home if the electrical system was flood-damaged and there is no other electrical source nearby. Indoor use of generators creates carbon monoxide hazards. If the home has electricity, hire an electrician to install one outlet box for construction, then shut off all the other electricity running through the house. You may also see if the local electric utility company can install an electric outlet box on a street pole that all the surrounding houses can use.



Set up secure tool storage area

You must keep your tools safe. If you are working out of a car, store your tools in the trunk and keep it locked. You can also bolt a strong box to the floor of the workspace. Screw carriage bolts through 2" x 4" boards running across the underside of the floorboards. Tighten the bolt inside the box. You may also want to think about setting up a community tool storage area.



Turn off gas

Turn off gas until the system is inspected.

Bathroom access

You must have a working bathroom. If the bathroom in your house cannot be used and there is no public bathroom nearby, rent a portable toilet. This can be shared by several neighbors. Set up a safety and cleanup area next to the toilet.

3. SITE PREPARATION

Set up a safety and cleanup area

Set up a safety and cleanup area outside the home that includes:

- First aid kit
- Fire extinguisher
- Cleanup buckets
- Eye wash station
- List of emergency phone numbers
- Drinking water

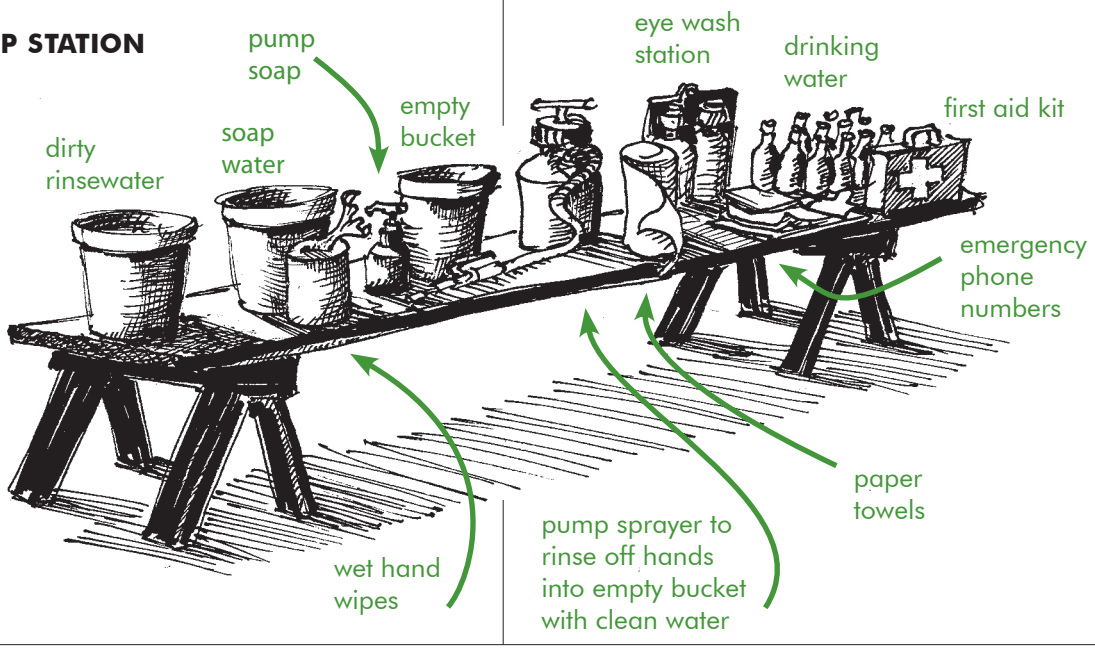
Use the cleanup area as a place to wash up before taking a break. In hot weather, take breaks every hour to avoid dehydration and heat exhaustion. Have bottled water on-site and drink it regularly. Use the area to treat minor accidents, such as cuts and punctures.

Put on your personal protection equipment

Put on your personal protective equipment – PPE (coveralls, boots, gloves, respirators, eye protection and head protection). Have partners, if possible, help you in and out of your coveralls and help you adjust your respirators. Check to make sure the respirator is working. Cover the filters with your hands and attempt to inhale; the respirator is working if no air enters.

Keep all of your PPE on when in the home. For breaks, leave the home and remove your PPE in the

CLEANUP STATION



cleanup area. Wipe/wash off your hands and face before eating, smoking or other activities. Remember to put your PPE back on before re-entering the home.

PUT ON YOUR PERSONAL PROTECTIVE EQUIPMENT

- Breathable polypropylene coveralls with elastic wrist and ankles
- Shoe covers (non skid), or high top shoe covers
- Gloves
- Hat or hood
- Respirator

Keep clean areas separate from the work areas

Separate storage or living space from the rest of the work area by hanging sheets of plastic sheeting (poly). Second floors that have no water damage or mold may be good places for storage. DO NOT store moldy items in the home. Dispose of these items or take them to a separate cleaning area.

Set up a "things-to-be-saved table"

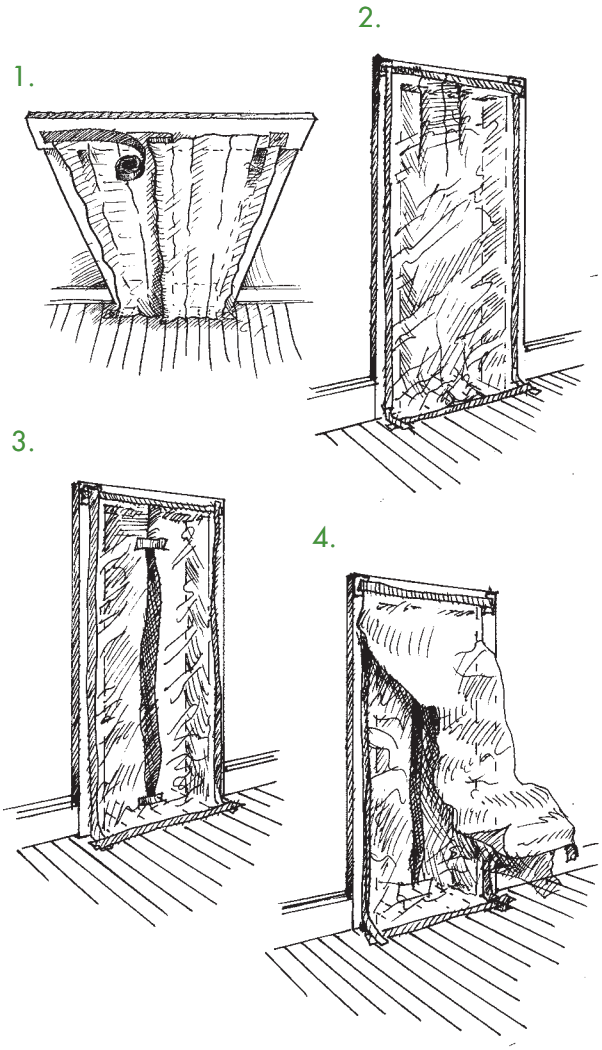
Set up a table outside of the house where you can put small objects until you can decide whether they can be cleaned and saved.

Lay plywood path

Set up a plywood pathway throughout the house if there was major damage to floorboards or there is the possibility that they are not safe to walk on (not structurally sound). Cut plywood into 2 ft. x 8 ft. sheets to build the pathway. If the entrance has steps, nail the plywood in place as a ramp to move wheelbarrows with debris out of the home.

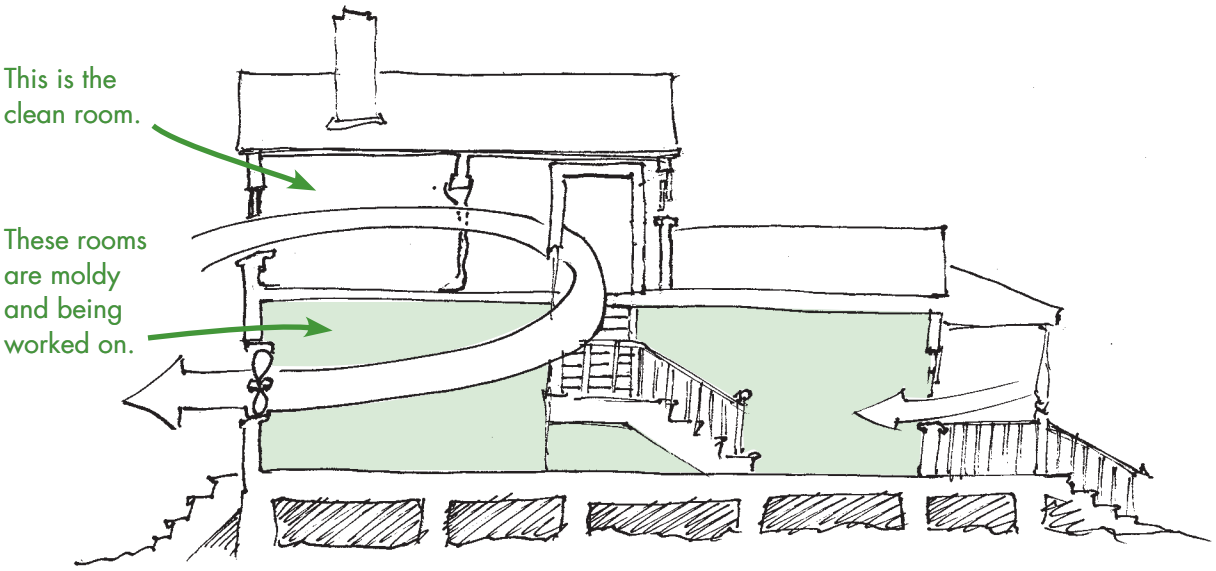
CLEAN-ROOM CONTAINMENT SYSTEM

1. First cover the opening with six mil plastic. The top two corners are reinforced with duct tape and staples and the perimeter is sealed with masking tape. It's important to make several folds so the plastic is not taught.
2. Then duct tape the bottom, stapling the corners, to the floor.
3. Cut a slit in the plastic from about 6" up from the floor, for passage.
4. Finally tape a sheet of plastic, as wide as the opening, to the door header, (not the sides or bottom). Let it hang a couple of inches from the floor. This works better if it's thin plastic. This flap gets attached on the clean-room side as the air current will be blowing from the clean room side pressing it against the cut opening.



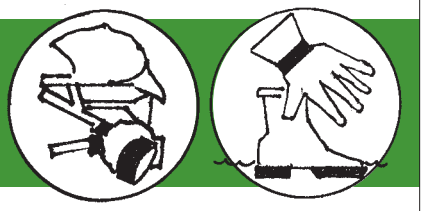
A CLEAN-ROOM SETUP

Set up a strong window fan in a first floor window blowing out. Set up the clean-room containment system on the doors of the second floor rooms. (It would be dangerous to put this system at the top of the stairs).



4. CLEAN-OUT

If you are saving items, move them to the restoration area as you work (see Section 7 for restoration procedure).



Air out

If building has not been open, open most windows and doors and leave for at least half an hour before beginning work. Remove any drapes or curtains to allow air and light to get into the home.

Remove small furniture and objects on floor

Place small items in heavy-duty trash bags to reduce the release and spread of mold spores.

Remove large furniture

Move large furnishings to the curb or dumpster. Use dollies or wheel barrows, if available, to lessen muscle strain. When lifting, remember to lift with your legs and not your back to avoid back injuries.

Remove appliances

Tape or tie refrigerators shut before removal to avoid spilling old food containing mold and bacteria. Make sure refrigerator doors stay tied or wired shut to keep children from playing in them.

Cut and remove wall-to-wall carpet

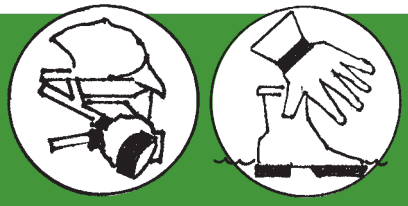
Remove wall-to-wall carpeting that is wet. Dry carpeting can remain on the floor as a "tarp" when you remove building materials from the walls and ceilings. The carpeting will protect the flooring under the carpet. Cut carpet in pieces before removing using a carpet cutting knife.

Clean out closets, shelves, storage areas and kitchen cabinets

Pots, dinnerware, buckets and other containers that filled with floodwaters need to be removed carefully. They may contain dangerous bacteria.

Place small items in heavy-duty trash bags to reduce the release and spread of mold spores.

5. GUT TEAR-OUT PROCEDURE



Many damaged homes contain valuable historic materials (such as doors, trim, stairs, etc.). These materials are usually of higher quality than what you can buy as a replacement. Try to save historic materials that are in good condition and can have the mold removed. However, remember that it may be cheaper to dispose of building parts that have been damaged by the flood or mold growth. If you choose selective tear out, see Section 7.

Remove and dispose of cabinets, shelves, doors and trim

Remove and dispose of interior doors. Pull cabinets and trim from walls. Remove trim first, then drywall. Bend over all protruding nails when you remove trim so as not to puncture yourself. Dispose of long boards by laying them on a piece of rope then tying them into a bundle.

Tear down drywall or plaster ceiling

If you cannot see mold growth on either side of the ceiling, the ceiling may be saved. If you plan to tear down the ceiling, work from a ladder almost as tall as ceiling. This stops the ceiling from coming down on top of you. Keep your head above the ceiling surface and push down with a crowbar.

Remove drywall from walls

Score drywall with a utility knife along the four-foot mark where the top and bottom pieces of drywall were taped together when the wall was built. Then pull out the drywall with the hook of the crowbar.

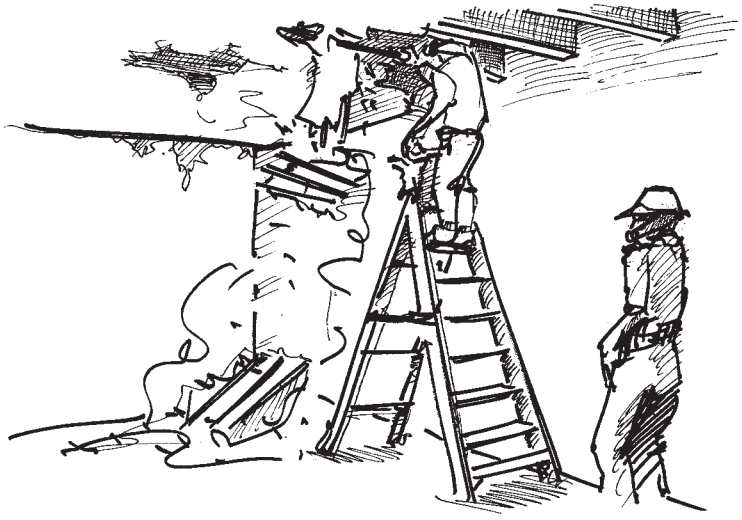
Remove drywall in the largest pieces possible to create less dust. Two people can work together to pull sheets from the wall. Once you have opened up an inside wall, push out the drywall into the next room. Remove nails and screws from studs.

Remove plaster from walls

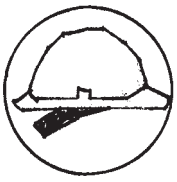
If electricity and a reciprocating saw are available, cut through plaster and lath between studs. Using a pry bar, pull plaster and lath away from studs. Two people working on either end of cut laths makes this much easier. Before cutting, make sure electricity in the wall is not on.

Use the pry bar to punch through walls and pull lath and plaster down when electricity and saws are not available.

Most of the removed lath should fall on top of the removed plaster. Bundle the lath separately and remove it. Then shovel plaster into large cans for disposal in a dumpster or heavy duty bags for curbside pick up.



TEARING DOWN A PLASTER OR DRYWALL CEILING



Work from a ladder that allows you to have your head above the ceilings and at the same time be standing at least two treads from the top of the ladder. Using a crowbar, push the ceiling down from above. Have a second person with you when you do this work.

Remove insulation

Place insulation in heavy duty trash bags and dispose of it.

Remove layers from floor

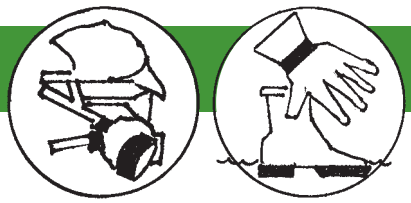
- Remove tiles, vinyl, linoleum and any remaining carpet.
- If there is a subfloor above the structural floor, remove it.
- Inspect the structural floor.

To save tongue and groove wood floors, see Section 7. Remove and replace composite board or plywood that is badly water damaged. If you need to remove partition walls to do this work, have this done by a construction professional.

ASBESTOS FLOOR TILES

Assume that rigid floor tiles measuring 8" X 8" or 9" X 9" from 1970 or before contain asbestos. Under normal conditions, these tiles should be removed by licensed asbestos workers following the regulations for asbestos projects. It is a violation to remove these tiles other than as part of an asbestos project. However, if you cannot stop from disturbing these tiles during the interior clean up, you should know that water-soaked tiles will release lower levels of asbestos than dry items.

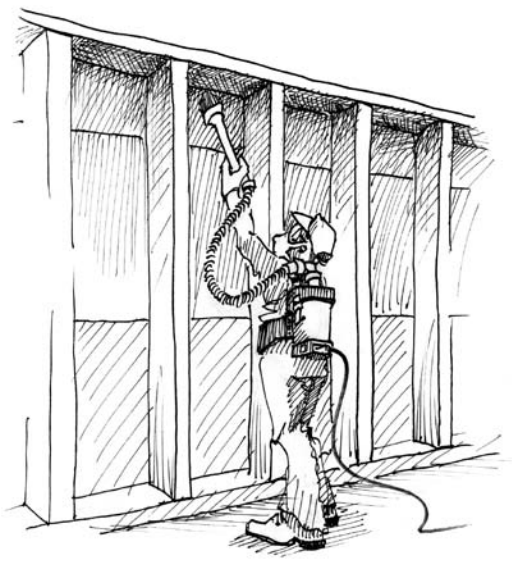
6. PRE CONSTRUCTION CLEANING AND TREATMENT



Prepare surfaces

Remove any remaining nails or screws from studs or ceiling joists. Brush ceiling, studs and exterior walls with a bristle broom or hand brush to remove all invisible insulation and pieces of drywall and loosen mold spores. Work from top to bottom.

After wood framing is thoroughly brushed or scraped, carefully vacuum all surfaces. Use a corner tool to access tight spaces.



Vacuum all surfaces

Clean all surfaces with a vacuum with a high efficiency particulate air (HEPA) filter (e.g., Craftsman® Shop Vac with HEPA filter). Wait at least one hour to let dust and spores previously in the air to settle, then reclean any remaining visible areas of mold growth following this method. *In homes where studs are already fairly dry, we recommend only the dry cleaning/HEPA vacuum step for wood studs. Wet cleaning should be skipped.*

Wet clean wooden surfaces (optional)

Damp wipe with a nonphosphate detergent (e.g., Savogran® TSP-PF) and wash all remaining wood surfaces such as studs, backs of exterior walls and floors where visible mold growth cannot be removed through dry cleaning. Follow the instructions on the package for preparation. Starting at the ceiling, wipe with sponge mops and hand sponges until all visible dirt and stains are removed.

During damp wiping, use the least amount of water possible to avoid soaking the building materials. If wood does become very wet, let it dry completely before taking the next steps. Wet surfaces that do not get fully dry may have new mold growth.

CLEANING TERMS:

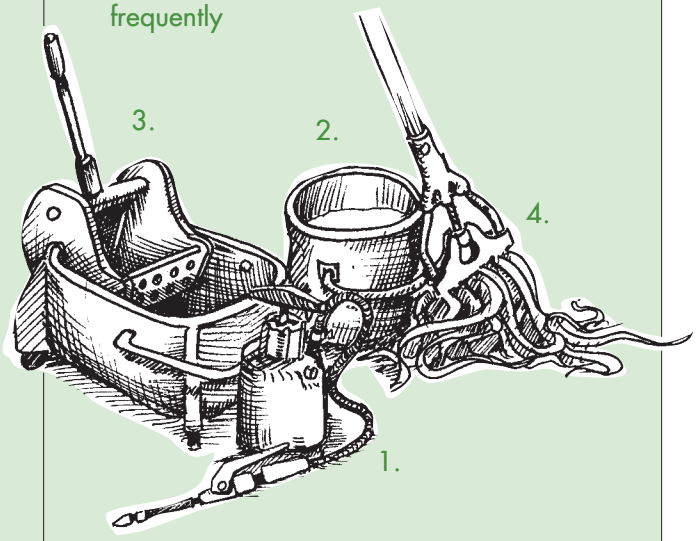
Wet Cleaning: Bleach may damage wood and some metallic surfaces and is less effective on porous surfaces like unpainted wood. On these materials, cleaning with a nonphosphate detergent (e.g., Savogran® TSP-PF) is recommended. Do not use detergents with trisodium phosphate (TSP). Follow manufacturer's directions for mixing the solution. Always allow surface to completely dry after washing. Brushes and sponges used for cleaning should be discarded at the end of the job.

Disinfection: Hard, nonporous surfaces that have been in flood waters may be contaminated with bacteria. Any materials that will be kept should be disinfected. Use a solution of one cup liquid chlorine bleach to one gallon water, plus nonphosphate detergent for cleaning and disinfecting. Never mix bleach and ammonia. Throw away any unused bleach solution at the end of the day because it loses effectiveness with time. Never spray bleach and be sure to wear rubber gloves and eye protection.

Liquid chlorine bleach is recommended for disinfection on: refrigerators, work surfaces, garbage disposals, freezers, sinks, appliances, plastic laminate, stoves, stovetops, countertops, (ceramic) tile floors or countertops, vinyl, linoleum, solid surface countertops, glass, garbage cans, trash cans, trash compactors, latex enamel painted woodwork and faucets. Brushes and sponges used for cleaning should be discarded at the end of the job.

THREE BUCKET CLEANING SYSTEM

1. Pump sprayer contains detergent (do not use sprayer for bleach)
2. Rinse bucket ~ should be changed frequently
3. Squeeze wringer bucket for dirty water
4. 32 oz mop head ~ clean or replace frequently



Disinfect all hard surfaces

Use a disinfectant to kill any remaining mold on hard surfaces that will remain in the home. Damp wipe all surfaces, including tubs, bath and kitchen fixtures and vinyl/tile floors, with liquid chlorine bleach and water mixed with nonphosphate detergent. Use one cup of bleach to one gallon of water. **Never mix bleach and ammonia.** Throw away any unused bleach solution at the end of the day because it loses effectiveness over night.

Treat surfaces with borate solution

Measure wood surfaces for moisture content with a moisture meter. Once the moisture content is less than 15 percent, it is ready for the application of a borate solution.

Wash or mist the open wall cavities with a borate solution (e.g., Termite Prufe®) prepared to the manufacturer's directions for wood fungi. Although these products are more expensive than household bleach, borate solutions do not corrode or whiten, so are safer to use around metals and valuable wood products. Borates also soak into wood more effectively. For best coverage, apply borate solutions with a pump up tank sprayer. A paint brush, paint roller, or trigger spray bottle may also be used. This treatment has the added advantage of discouraging termite infestations.

Dry out the building

Make sure that the home is allowed to completely dry before beginning restoration. Depending on how dry the home is before the clean-up work begins, natural ventilation may produce a dry home in a couple of weeks or a few months.

If electricity is available, use fans, dehumidifiers, and window air conditioners to help speed drying.

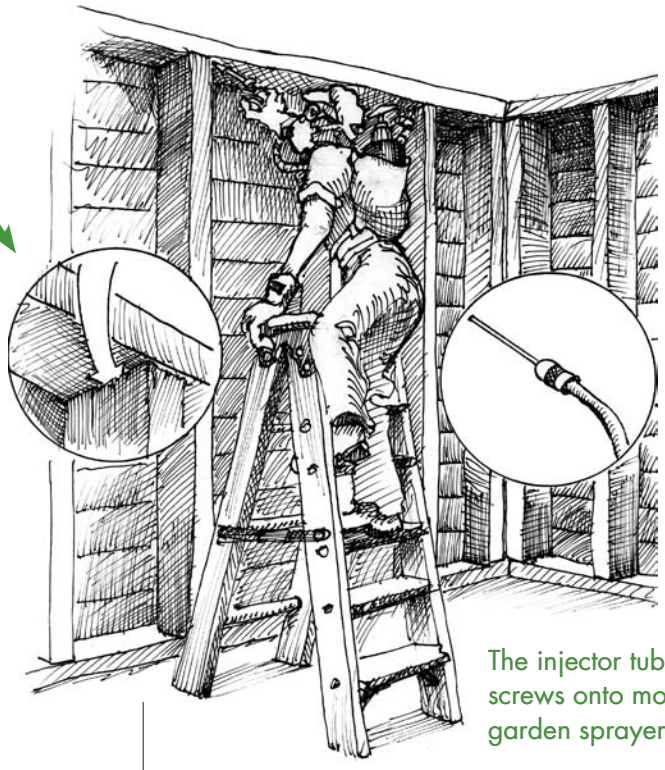
Have the contractor who will restore the home check the moisture content of wood framing to be sure it is dry before beginning to close in walls or finish flooring. Wood studs or framing with less than 15 percent moisture content are considered dry.

Treat remaining wood studs with fungicidal coating (optional)

Before beginning reconstruction, paint dried wooden studs and beams with a low toxicity fungicidal protective coating such as Zinsser Qt B-I-N® Primer-Sealer or Foster® 40-50™ Mold Resistent Coating as a final treatment to prevent mold growth.

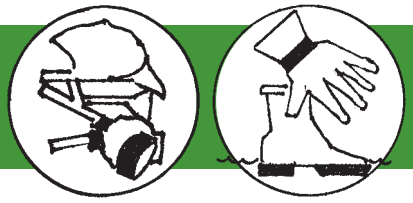
Using the applicator tube to soak the end grain of a stud

The borate treatment will last many years if applied correctly. It will protect the house from mold, termites and wood rot. Many of the most important spots to treat are the hardest to reach. This is particularly true of the end-grain of structural members that butt against another structural member (for example studs against top and bottom plates). Termite Prufe® supplies an injector set for a pump sprayer including a 3/32" tube for spraying into crevices, and a second tube that can be used to spray into voids accessed by drilling a 1/8" hole.



The injector tube that screws onto most garden sprayers

7. SELECTIVE TEAR OUT AND PREPARATION BEFORE RESTORATION



Clean up as you go

Every piece of moldy material you clean out can re-contaminate the work you have done. As you work, remove large objects from the building and place smaller objects in heavy-duty trash bags.

Open attic

Ventilate the attic if you plan to save a plaster or drywall ceiling. If there is no access hole, cut one into the ceiling in a closet.

Open crawl space

Crawl spaces must be open to air in order to dry out the house. At a minimum, create openings at the opposite ends of the crawl space. If electricity is available, set up a fan to blow air out of the opening at one end; this will pull air through the space. If a commercial dehumidifier is available, it can be kept running in the crawl space until it is dry. Because this space may be contaminated, wear maximum protection whenever you have to enter it.

Drywall

Drywall that has been underwater must be removed. If flood or mold damage is high, remove all of the drywall to the ceiling.

If there has been limited flooding, drywall may be removed to the 4 foot line. Drywall is sold in 4 foot sections. NO MOLD must be visible above the 4 foot line on both the inside and outside of the wall for this option to be safe.

Plaster walls

If plaster is sound on the walls facing the outside and there is no insulation in the wall, try to save the plaster walls. To dry out wall cavities, remove the baseboard, then remove plaster to just below the top of the baseboard.

Insulation

Dispose of insulation in heavy-duty trash bags.

Kitchen cabinets and countertops

Kitchen cabinets made of pressboard or other composite boards that have gotten wet cannot be saved. Cabinets, especially top cabinets, made of plywood or wooden boards may be saved. You can save the counter top and kitchen sink with work fixtures and plumbing when you replace the base cabinets.

Kitchen and bathroom Fixtures

Use a disinfectant to kill any remaining mold and other contaminants on hard surfaces that will remain in the home. Damp wipe all surfaces including tubs, bath and kitchen fixtures, counter tops and vinyl/tile floors with a disinfecting solution (see Section 6).

Wood Flooring

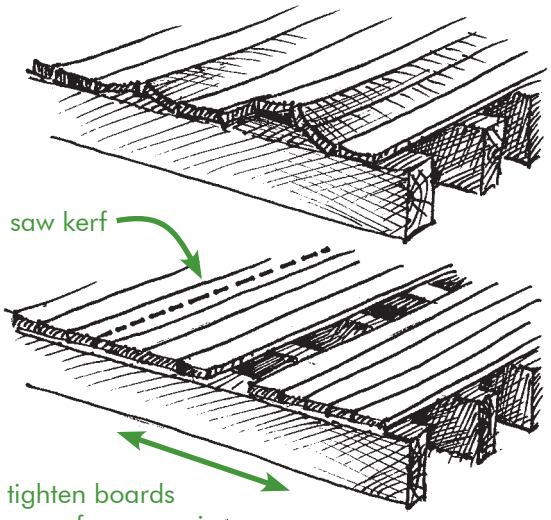
Gulf Coast residents take pride in their tongue-and-grove wood floors. These floors can be saved if the underside has been able to dry out. Remove all overlayment material as quickly as possible to allow the top surface to dry. Scrub and vacuum floor joists. If there is severe buckling of the flooring, make a kerf cut along the length of a floorboard to create an expansion space. HEPA vacuum, then scrub floors with a wet cleaning solution (see Section 6) to prepare for sanding and refinishing. Then screw through the top of the buckled board to the joists. Sand and finish the floors as soon as possible.

Ceramic Flooring

Ceramic flooring laid directly onto cement/concrete slabs may require only HEPA vacuuming, and then washing with a disinfecting solution (see Section 6). Remove and dispose of ceramic flooring placed on plywood or presswood subflooring that is damaged.

Wood windows, doors and trim

Wet scrape all wood to be saved or scrub it with a wet abrasive sponge to remove loose paint. Assume all paint on pre-1978 house trim has lead in it. Scrub the surface with a wet cleaning solution.



REPAIRING BUCKLED TONGUE AND GROVE FLOOR

For minor buckling cut a saw kerf through the center of one board. This will create an 8th inch space that will allow the board to be screwed flat. If there is major buckling remove one floorboard in the center of the warped area. Force the boards on both sides tight to each other. Face-screw the boards down. Scribe the board you removed and cut off the excess on the tongue side. Face screw this board down. You'll probably need to drill pilot holes for the finish head screws or the heads will strip.

(see Section 6). Vacuum the surface, let it dry completely, then paint with fungicidal primer (e.g. Zinsser Qt B-I-N® Primer-Sealer). Treat doors and windows in this way:

- Remove doors if they are swollen and heavily damaged. Doors in older building made from old growth lumber usually can be saved and are valuable. Have these professionally restored.
- Secure the top window sash to the window frame. Screw a metal bracket or block of wood under the top sash to hold in place. Paint the sash as part of exterior surface. Bottom sashes may need to be removed and restored before hanging against new window stop molding.

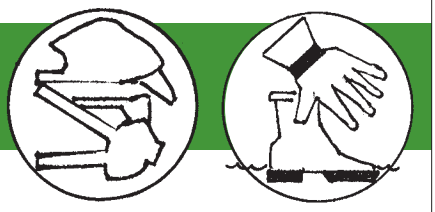
Heating and air conditioning systems

Remove and throw away all ductwork and air handling equipment that was under water. Inspect the inside and outside of air handlers and ducts that were not under water for signs of mold. Fiberglass insulation on the interior surfaces of air handlers and air supply ducts can have a lot of mold growth. Visible mold growth on air handlers can be painted with an encapsulant coating to keep it from spreading, such as Foster 40-20® Fungicidal Protective Coating.

Inspect the interior and exterior of flexible duct work. Any flexible ductwork that has mold growth should be replaced.

8. RESTORE POSSESSIONS

See Section 6 for cleaning terms.



Wood furnishings

Sponge off with clean water using a soft sponge or cotton rag. Blot off all excess water with clean cloths or paper towels. Clean with a wet cleaning solution. Allow to slowly air dry. If upholstered furniture and bed frames are valuable, remove and discard all the cloth and padding, pull out all tacks and staples and then treat wood as above.

Clothing, drapery and other cloth

Clothes should generally be thrown away after flooding. If clothing and other cloth materials will be saved, remember they may contain mold or other contaminants from the flood waters. Wash clothing in a washing machine, not by hand. Add two tablespoons of liquid chlorine bleach per washer load. Dry cleaning may also be used, especially for special fabrics such as wool and silk.

China, glass, jewelry, porcelain and metal possessions

Damp wipe these items with wet cleaning solution or wash them in a dishwasher to remove dust and superficial mold. Wash or wipe items in disinfecting solution and rinse after five minutes. Wipe dry, and be sure that they have dried completely before moving them to storage. Pots, dinnerware, buckets and anything else that was filled with floodwaters need to be removed carefully. They may contain dangerous bacteria.

Electric appliances

Unplug appliances and leave open to dry. Have them inspected by a competent appliance repairperson before reusing.

Small valuables

Photos and papers may be frozen in zippered plastic freezer bags and stored until a professional restoration expert can recommend what to do with them. Valuable artwork can be HEPA vacuumed to remove surface mold, then wiped with damp paper towel and air dried. A tac-cloth may be used to speed drying.

APPENDIX 1

Supplies and Materials

Worker Protection

- ☐ N95 or N100 respirator with exhaust valve
- ☐ Half-face negative air respirator with HEPA filter canisters or powered air hood respirator
- ☐ Heavy-duty water-proof gloves
- ☐ Nonwoven polypropylene disposable coveralls (w/attached hood and foot cover)
- ☐ Goggles or safety glasses with side shields
- ☐ Cap with brim
- ☐ Non-skid shoe covers (300 to a case)
- ☐ Personal cleanup station
  - ☐ Two 16 oz. eye wash bottles
  - ☐ First aid kit (OSHA-compliant for four workers)
  - ☐ Fire extinguisher
  - ☐ Three 2-gallon buckets
  - ☐ Pump pressure sprayer
  - ☐ Pump soap
  - ☐ Case of bottled drinking water
  - ☐ Paper towels
  - ☐ Toilet paper
  - ☐ Emergency phone number sheet

Supplies

- ☐ Contractor trash bags
- ☐ Heavy-duty trash bags for heavy material such as plaster
- ☐ Extra bags for vacuum cleaner
- ☐ Two large heavy-duty garbage cans with casters
- ☐ Roll of 10 ft. wide 6 mil poly
- ☐ Staples for staple gun
- ☐ Rolls of duct tape
- ☐ Scrub brushes
- ☐ Carbon blade scrapers
- ☐ Cardboard boxes to store cleaned objects
- ☐ Mist bottles
- ☐ Utility knife blades
- ☐ Hundred watt light bulbs for reflector lamp
- ☐ Box of disposable gloves
- ☐ 32 oz. mop heads
- ☐ Nonphosphate detergent (like Savogran® TSP-PF)
- ☐ Household chlorine bleach (like Clorox® Regular-Bleach)
- ☐ Borate product (like Termite Prufe®, available by calling 805-565-1566)
- ☐ Fungicidal primer for wood (like Foster® 40-50™ Mold Resistant Coating or Zinsser Qt B-I-N® Primer-Sealer)
- ☐ Fungicidal encapsulant for heating ducts (like Foster® 40-20™ Fungicidal Protective Coating)
- ☐ Paint rollers for primer coating

Tools

- ☐ Carpet cutter with extra blades
- ☐ Front-end nipper (to pull nails)
- ☐ Large crow bar
- ☐ Long handled flat-bar
- ☐ Short flat-bar
- ☐ Staple gun
- ☐ Cat's paw nail puller
- ☐ Mop squeeze bucket
- ☐ 3- 5 gal. buckets (one as a rinse bucket, two as mixing buckets for borates)
- ☐ 2 – 2.5 gal. pump sprayers for borates
- ☐ Mop handle for 32 oz. mop head
- ☐ Broom and dust-pan
- ☐ Bright flashlight
- ☐ Tool belt and tool belt tools including hammer, measuring tape, scratch awl, Phillips and flat-head screw drivers, carpenter's pencil, utility knife, etc.
- ☐ Saw horses
- ☐ Cross-cut hand saw
- ☐ Brace and bits (where there is no electric)
- ☐ Drywall saw
- ☐ Moisture meter (like Delmhorst® J-LITE Moisture Meter)

Equipment

- ☐ Portable generator
- ☐ 20 ft. extension ladder
- ☐ 8 ft. A-frame ladder
- ☐ Dehumidifier
- ☐ Window fan
- ☐ Lock box
- ☐ Shop vacuum with HEPA filter

This publication was reprinted through the generous support of The Home Depot Foundation.

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