

After the Flood: Clean-Up Safety Tips for Business Owners

The danger of a flood does not end when the rains cease and the flood waters recede. Workers and volunteers involved with flood cleanup should be aware of the potential dangers involved, and should take proper safety precautions to prevent illnesses and injuries that can accompany cleanup efforts.

**TAKE IMMEDIATE STEPS TO ENSURE PERSONAL SAFETY.
DO NOT ENTER A FLOOD-DAMAGED BUILDING WITHOUT
ENSURING PROTECTION FROM COLLAPSE, ELECTROCUTION,
HAZARDOUS MATERIALS, AND CONTAMINATION.**

Take Immediate Steps to Ensure Personal Safety

Before Entering A Flood-Damaged Building

- Remember that buildings that have been submerged or have withstood rushing flood waters may have suffered structural damage and could be dangerous.
- Before entering a building, check for structural damage. Don't go in if there is any chance that the building, or parts of it, may collapse. If you see damage, have a qualified person check the building before you enter.
- Never assume that water-damaged structures or ground are stable.
- Assume that all stairs, floors, and roofs, and overhangs are unsafe (until they are inspected).

Be Cautious About Hazardous Materials

Flood waters can dislodge tanks, drums, pipes, and equipment, which may contain hazardous materials such as pesticides, chemicals, or fuels.

- Do not attempt to move unidentified dislodged containers without first contacting the local fire department or hazardous materials team.
- If you are working in potentially contaminated areas, wear appropriate protective clothing and respirators.
- Frequently and thoroughly wash skin areas that may have been exposed to pesticides and other hazardous chemicals.

Getting Around Safely

- Emergency workers will be assisting people in flooded areas. You can help them by staying off the roads and out of the way. Keep listening to the radio for news about what to do, where to go, or places to avoid.
- Roads may still be closed because they have been damaged or are covered by water. Floodwaters often erode roads and walkways. Barricades have been placed for your protection. If you come upon a barricade or a flooded road, turn around and go another way. Don't try to assess the depth of the water on a road. If the road is covered, Don't drive over low-water bridges.

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- If your vehicle stalls, get away from it and get to higher ground. A car will float in as little as two feet of water. More people drown in their cars than anywhere else.
- Remember that standing water may be electrically charged from underground or downed power lines.
- Be careful walking around. Flooding may change familiar places, and steps and floors are often slippery with mud.
- Do not walk through flooded areas. As little as six inches of moving water can knock you off your feet.
- Stay away from areas subject to additional flooding, such as low areas, stream beds, and ditches.
- Stay on firm ground.
- Be especially careful at night or in dark conditions when it is harder to see flood dangers.
- Flooded areas can be covered with debris, including nails and broken glass. Flood waters and debris may hide live animals or animal carcasses, and flood waters are often contaminated with biohazards (sewage, medical waste, animal waste and carcasses) or other hazardous materials (fuels, asbestos, farm chemicals, etc.). Wear appropriate personal protective equipment if you must come in contact with flood waters.
- To reduce the risk of drowning; avoid working alone, and wear a Coast Guard-approved life jacket when you are working in or near flood waters.

Be Cautious About Contaminated Floodwater

Floodwaters are often contaminated with biohazards (sewage, medical waste, animal waste and carcasses) or other hazardous materials (fuels, asbestos, farm chemicals, etc.). Flood-damaged buildings may also have damp areas where molds, mildews, and other organisms thrive.

- Assume that anything touched by floodwater is contaminated.
- Use appropriate personal protective equipment if you must come in contact with flood waters.
- Make sure that all workers have current tetanus shots.

Secure the Buildings and Utilities

Secure the Facility

- Post security guards to monitor your property and facilities, since alarm systems may not be functioning, and since buildings may have to be left open during salvage and restoration.
- Provide guards with names of staff or contractors who have permission to be at the site.

Inspect, Repair, and Restore Fire Protection Systems

Fire can pose a major threat to an already badly damaged flood area for several reasons: inoperative fire protection systems, hampered fire department response, inoperable firefighting water supplies, and flood-damaged fire protection systems. In addition, the presence of live electrical circuits and equipment, accumulated debris, and floating flammable liquids can increase the risk of fire. Workers and employers must therefore take extra precautions.

- Restore fire protection systems as quickly as possible. Flood waters can rupture flammable liquid tanks and piping and clean-up activities will generate large piles of debris, and the risk of fire is high.
 - Examine fire protection systems for physical damage.
 - Test sprinkler control valves to make sure they are in the “open” position. If valves are closed, check for broken or disconnected piping before you reopen them. Remove water and mud from valve pits.
 - Inspect for obstructions in yard mains and sprinkler systems, if open bodies of water have been used for suction.
 - Inspect supports and foundations around tanks and yard main systems; flood waters may have caused washouts.
 - Inspect and repair pumps, drivers, and controllers.
 - Replace fire extinguishers.

Inspect, Repair, and Restore Other Essential Safety Devices

- Replace all gas control valves, electric circuit breakers, ground fault circuit interrupters (GFCIs), and fuses that have been under water to avoid electrocutions, explosions and fires. Even if these safety devices appear to function after being submerged in a flood, they are unfit for continued use and cannot be repaired. They may eventually fail, causing electrocutions, explosions or fires.
- Have a qualified technician inspect other parts of gas and electric appliances that have been submerged (such as fans, motors, electric circuits, and venting systems) to ensure continued safe operation. Replace appliances if needed.
- Replace smoke detectors and carbon monoxide (CO) alarms that have been submerged.

Ensure Fire Safety During Clean Clean-Up and Restoration

- Be sure that the sprinkler system is inspected and fully functional before beginning any welding or hot work.
- Be sure to follow proper controls for welding and hot work repairs.
- Provide at least two fire extinguishers, each with a UL rating of at least 10A, at every cleanup job.
- Remove combustible debris as soon as possible.

Clean and Restore Electrical Equipment Properly

- Dry electrical equipment: Open equipment doors, pull out drawers, etc., to allow water to run out. Remove standing water with wet vacs. Use low pressure air to blow out trapped water. Use absorbent pads to take up water if needed.
- Remove water from under raised floors, such as in computer rooms.
- Unplug appliances and lamps, remove light bulbs, and remove cover plates of wall switches and outlets that got wet.
- If local building inspection code allows you to disconnect wiring from switches and outlets, do so and throw away the switches and outlets. If your building inspector says that you cannot disconnect the wiring, pull them forward, away from the wall, and leave them connected.

Identify Damage and Begin Clean-Up of Building Contents

Document the Damage

- Once it is safe to enter the building, make a preliminary tour of all affected areas. Wear protective clothing.
- Do not move equipment or other objects without documenting their location and condition.
- Use a Polaroid-type camera or video camera to record conditions of structure, equipment, and furnishings. Make sure images clearly record the damage. Supplement these with better quality photos when necessary.
- Make notes and voice recordings to accompany the photographs.
- Assign staff to keep written records of contacts with insurance agents and other investigators, staff decisions on retrieval and salvage, and costs associated with clean-up and salvage.
- Make visual, written, and voice records for each step of salvage procedures.

Begin Clean-Up

After the flood waters have subsided, start to clean and disinfect the building. However, don't work in or around any flood-damaged building until it has been examined and certified as safe for work by a qualified person.

- Remove standing water from the facility. Use a mop, squeegee, absorbent materials, or a wet/dry vacuum cleaner.
- Begin draining the basement in stages, about a third of the water volume each day. Pumping out water too quickly may cause structural damage.
- Provide air movement and control humidity. Keep the building cool.
- Remove as much mud as possible. Once you've checked the water system for leaks, hose down the inside of the building and its contents. It's best to use an attachment that sprays soap to wash and rinse the walls, floors, furniture, sockets, electrical boxes and other major items that got muddy.
- Clean and dry damaged equipment and property (take care of the most important pieces first). Take special steps with documents and computer files.
- Dispose of all debris properly. Follow all applicable regulations regarding hazardous wastes, disposal, and recycling. If necessary, contract with a hazardous waste firm for proper handling of hazardous materials.
- If necessary, contract with a disaster recovery consultant to complete the necessary cleanup and restoration.

Decontaminate Buildings and Contents

- Remove loose dirt and debris from affected surfaces, using a power hose.
- Use a combination of household bleach (1/2 cup bleach per gallon of water) and soap or detergent to wash down walls, floors, and other contaminated areas, including exterior surfaces.
- Keep the surface wet for 5-15 minutes.
- Rinse thoroughly with a power hose to remove any residue. This will eliminate fungal problems and their dangers.
- Follow directions on containers and take particular note of warnings. Do *not* mix cleaning compounds containing ammonia with bleach.
- Remove heating and cooling registers and ducts, then hose the ducts to prevent contamination from blowing through the ducts at a later date. After hosing duct work, wash with a disinfectant or sanitizer that is phenolic or pine-oil based. If ducts are in concrete or otherwise inaccessible, have them cleaned professionally.
- Discard clothing, carpets, upholstered furniture, and similar items if they cannot be cleaned and disinfected.
- Take immediate action to minimize the growth of molds and fungi.
 - Inventory all flooded areas so that every water-damaged area is identified, treated, and cleaned.
 - Remove and dispose of all wet ceiling tiles and drywall within 24 hours of water contact.
 - Remove and replace all drywall and insulation up to 12 inches above the water line.
 - Dry all wet light fixtures.
 - Replace water-damaged furniture, including wood, or clean it with a 10% bleach solution. (Note: be sure to verify that bleach will not discolor or damage surfaces before application. When in doubt, test in a small hidden area before general application.) Discard furniture made of or with particle board or pressed board. Treat fabrics as you would carpeting (see below).
 - Leave all cabinets and drawers open to facilitate air flow for drying. Treat surfaces of cabinets and drawers with the dilute bleach solution.
 - Remove and discard all non-essential wet files and paper. Remove essential paper to a location where it can be dried, photocopied, and discarded.
 - If a large amount of paper cannot be dried within 24 hours, rinse essential files with clean water and freeze them temporarily until proper drying can take place. (Freezing will prevent mold growth.)
 - Immediately remove as much water as possible from wet carpeting, using a water vacuum.
 - After wet vacuuming, shampoo the carpet with a 10% bleach solution twice within a thirty minute period. Begin shampooing immediately after wet vacuuming. Spot test an inconspicuous area before proceeding.
 - Rinse the carpet with clear water to remove the bleach, and ensure that the carpet is totally dry within 12-24 hours of treatment.
 - If the carpet fades with the bleach solution, then dry the carpet immediately and treat it with an alternate biocide. Consult a public health official, microbiologist, or industrial hygienist to determine the right biocide.
 - When any form of biocide (including bleach) is used, increase air circulation and ventilation.
 - Use dehumidifiers and air conditioning to speed the drying process.
 - If odors or complaints of health effects exist after the clean up, consult an industrial hygienist or environmental microbiologist to determine the need for bioaerosol testing.

Ensure Worker Safety During Clean-Up

Remember That Stress, Long Hours, and Fatigue Increase the Risks for Injuries and Illness

Continued long hours of work, combined with emotional and physical exhaustion and losses from damaged homes and temporary job layoffs, can create a highly stressful situation for flood cleanup workers. Workers exposed to these stressful conditions have an increased risk of injury and emotional crisis, and are more vulnerable to stress-induced illnesses and disease. Emotional support from family members, neighbors, and local mental health professionals can help to prevent more serious stress-related problems in the difficult months ahead. People working in all phases of flood cleanup can reduce their risks of injury and illness in several ways:

- Set priorities for cleanup tasks and pace the work over several days (or weeks). Avoid exhaustion.
- Resume a normal sleep schedule as quickly as possible. Get plenty of rest and take frequent rest breaks *before* exhaustion builds up.

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- Take advantage of disaster relief programs and services in your community.
- Be alert to emotional exhaustion or strain. When family members and neighbors are unavailable for emotional support, consult professionals at community health and mental health centers.

Be Ready to Provide First Aid

First aid, even for minor cuts and burns, is extremely important when exposure to waters potentially contaminated with human, animal, or toxic wastes exists. Immediately clean out all open wounds and cuts with soap and clean water. Most cuts, except minor scratches, sustained during flood cleanup activities will warrant treatment to prevent tetanus. If you are injured, contact a physician to determine the necessary type of treatment.

Provide Assistance to Employees and Their Families

- Employees may be stranded at your facility. Be prepared with food, water, blankets, transportation, radios, etc.
- Good communication is essential. Help your employees stay in touch with their families. Provide frequent updates about the status of the flood, community recovery, and your plans for recovery.
- If necessary, help your employees secure shelter, medical care, food, water, clothing, cash, transportation, disaster aid, etc., for themselves and their families. The recovery of your business depends on the availability of your workers.
- Provide information and assistance to help employees and their families deal with injuries or deaths, or with damage to their homes and property (see attached).

Provide Appropriate Personal Protective Equipment

For most work in flooded areas, you will need the following personal protective equipment: hard hats, goggles, heavy work gloves, respirators, and watertight boots with steel toe and insole (not just steel shank). Excessive noise from equipment such as chain saws, backhoes, tractors, pavement breakers, blowers, and dryers may cause ringing in the ears and subsequent hearing damage. If you are working with any noise over which you must shout to be heard, wear earplugs or other hearing protection devices.

Ensure Electrical Safety

Use extreme caution while working with electrical equipment, attempting to restore power, or clearing areas near downed power lines. These steps may save your life:

- Treat all power lines as energized until you have followed the required procedures for de-energizing and testing them with an appropriate testing device. Do not rely on "fuzzing" to determine if a power line has been de-energized.
- Verifying that a line is not energized may not ensure your safety. You must also ground lines on both the load and supply sides of the work area. Grounding is necessary to protect you from the hazards of feedback electrical energy from a secondary power source, such as a portable generator.
- When restoring power in underground vaults, added precautions are necessary to prevent explosions. As vaults containing electrical connections are drained or pumped out, and as connections are energized, potentially explosive gases may form. Follow appropriate regulations for working safely in confined spaces.
- When using gasoline and diesel generators to supply power to a building, switch the main breaker or fuse on the service panel to the "off" position *prior to starting the generator*. This will prevent inadvertent energization of power lines from "backfeed" electrical energy from the generators, and help to protect utility line workers from possible electrocution/ If clearing or other work must be performed near a downed power line, contact the utility company to discuss de-energizing and grounding or shielding of power lines. Extreme caution is necessary when moving ladders and other equipment near overhead power lines to avoid contact.

Be Cautious About Carbon Monoxide

Flood cleanup activities may involve the use of gasoline- or diesel-powered pumps, generators, and pressure washers. Because these devices release carbon monoxide, a deadly, colorless, odorless gas, operate all gasoline-powered devices outdoors and *never* bring them indoors. It is virtually impossible to assess adequate ventilation.

Prevent Musculoskeletal Injuries

Cleanup workers are at risk for developing serious musculoskeletal injuries to the hands, back, knees, and shoulders. Special attention is needed to avoid back injuries associated with manual lifting and handling of equipment or debris and building materials. To help prevent injury, use teams of two or more people to move bulky objects, avoid lifting any material that weighs more than 50 pounds (per person), and use proper automated-assist lifting devices.

Prevent Thermal Stress

- **Heat.** When clean-up takes place during warm weather, workers are at serious risk for developing heat stress. Excessive exposure to hot environments can cause a variety of heat-related problems, including heat stroke, heat exhaustion, heat cramps, and fainting. To reduce the potential for heat stress, drink a glass of fluid every 15 to 20 minutes and wear light-colored, loose-fitting clothing. Additionally, incorporate work-rest cycles into work routines, work during the cooler hours of the day, when possible, or distribute the workload evenly throughout the day. When air conditioning is unavailable, open windows and use fans.
- **Cold.** Standing or working in water which is cooler than 75°F (24°C) will remove body heat more rapidly than it can be replaced, resulting in hypothermia. To reduce the risk of hypothermia, wear high rubber boots, ensure that clothing and boots have adequate insulation, avoid working alone, take frequent breaks out of the water, and change into dry clothing when possible.

Ensure That Only Trained Workers Operate Heavy Equipment

Only people who are properly trained should operate heavy equipment (such as bulldozers, backhoes, and tractors).

Ensure Safe Work in Confined Spaces

If you are required to work in a boiler, furnace, pipeline, pit, pumping station, septic tank, sewage digester, storage tank, utility vault, well, or similar enclosure, you should be aware of the hazards of working in confined spaces. Toxic gases, a lack of oxygen, or explosive conditions may exist in the confined area, resulting in a potentially deadly atmosphere. Because many toxic gases and vapors cannot be seen or smelled, never trust your senses to determine if safe entry is possible. *Never* enter a confined space, even to rescue a fellow worker, unless you have been properly trained! If you do not have the proper training and equipment, contact your local fire department for assistance.

Be Aware of Agricultural Hazards

If you are involved in cleanup efforts on or near farms, you may face these additional hazards:

- **Confined Spaces on Farms.** Molding or fermenting agricultural materials in confined spaces may generate large amounts of toxic gases which could cause lung damage or death if inhaled. Turn on fans or blowers in silos and other storage areas at least 30 minutes before entering and leave them on while working. Never open an oxygen-limiting silo if heating is suspected. Also, never enter these areas alone, and always use a full body safety harness.
- **Respiratory Hazards.** Wet hay, grain, silage, compost, and other organic/agricultural materials often grow large amounts of bacteria and mold during warm weather. Breathing these organisms and the organic dust produced may cause lung disease. Use proper engineering controls, including adequate fresh air ventilation. When exposure to organic dust cannot be avoided, use NIOSH-certified air-purifying respirators with high efficiency particulate air (HEPA) filters to reduce the risk.
- **Fire Hazard of Stored Hay.** Wet hay will mold very quickly. The biological processes involved in the formation of bacteria and mold can cause the hay to undergo spontaneous combustion. Monitor wet hay for odors, hot and damp areas, and rising vapors. If you detect these hazards, remove the wet hay from the building.

Sources of Information and Assistance

American Red Cross (www.redcross.org)
Environmental Protection Agency (www.epa.gov)
Federal Emergency Management Agency (www.fema.gov)
National Electrical Manufacturers Association (www.nema.org)
National Institutes for Occupational Safety and Health (www.cdc.gov/niosh/flood.html)
Occupational Safety and Health Administration (www.osha.gov)
Public Risk Management Association (www.primacentral.org)