



the standard in safety

# After the Storm

## Floodwater safety



**Underwriters  
Laboratories**



# Health Issues and Short Term Safety

Floodwaters are likely to be contaminated with unknown chemicals, oils, sewage, fertilizers, bacteria, germs and silt.

Any of these can cause illness or death. Therefore, it is essential that you protect yourself and your family by following these steps:

- **Stay out of the floodwater.**
- **Do not drink, cook, wash dishes or bathe in floodwater.**
- **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, upholstered furniture, drywall, etc. These items can be a source of mold growth and should be removed from the home.
- **Thoroughly clean and sanitize all hard surfaces** such as flooring, concrete, molding, countertops appliances, and plumbing fixtures with hot water and laundry or dish detergent. Sanitize (sanitizing solution should consist of one capful of bleach in one gallon of water) ALL items that come in contact with floodwater. Cleaning is very important because even dead mold may cause allergic reactions in some people.
- **Clean up any mold growth in your home and fix any water problem in your home** such as leaks in roofs, walls, or plumbing. Controlling moisture in your home is the most critical factor for preventing mold growth.
  - To remove mold growth from hard surfaces use commercial products, soap and water, or a bleach solution of no more than 1 cup of bleach in 1 gallon of water. Use a stiff brush on rough surface materials such as concrete.
  - 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  $\frac{1}{4}$  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.
- **Do not plug a portable generator into an outlet, patch it into electrical wiring or connect it directly to a main electrical panel.** Doing so could damage equipment, cause fires or cause power to flow into an electrical line, endangering persons in the home, neighbors and, possibly, utility crews working in the area.
- **For more information on water and food safety after a flood** from the Centers for Disease Control and Prevention, go to: <http://emergency.cdc.gov/disasters/floods/>

The International Association of Electrical Inspectors (IAEI) and Underwriters Laboratories offer the following warnings about the dangers present when water comes in contact with electricity. Follow these safety recommendations when handling electrical equipment that has been exposed to water.

# Electrical Safety

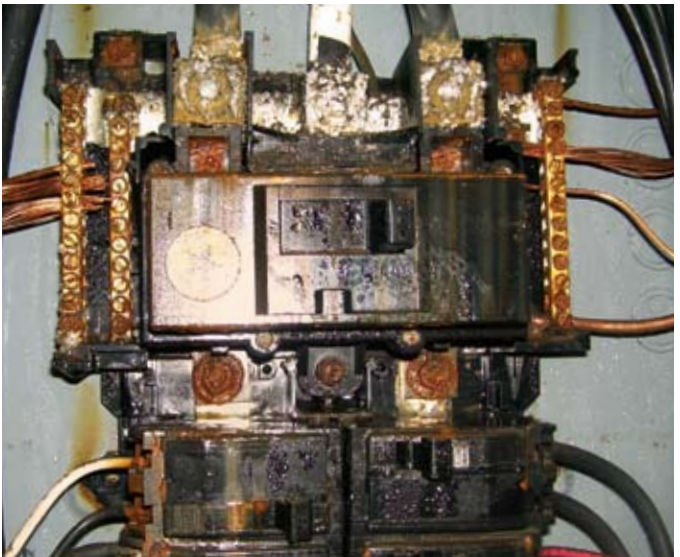
Flooding forces homeowners to ask many difficult questions about water-damaged electrical equipment in their houses.

- Can I use appliances after they dry out?
- Are circuit breakers and fuses safe to use?
- Will I need to replace my electrical wiring?

Floodwater contaminants can create serious fire hazards if electrical wiring and equipment have been submerged in water. Even with professional cleaning and drying, sediments and toxins are difficult to remove.

As families begin to clean up after a flood, there may be hidden electrical hazards. This is not a do-it-yourself project! Before beginning, have a qualified electrician check the house wiring, assess other damages and proceed with repair work. Then, follow these important safety tips:

- Do not flip a switch or plug in an appliance until an electrician tells you it is safe.
- Do not touch a circuit breaker or replace a fuse with wet hands or while standing on a wet surface. Use a dry plastic- or rubber-insulated tool to reset breakers and use only one hand.



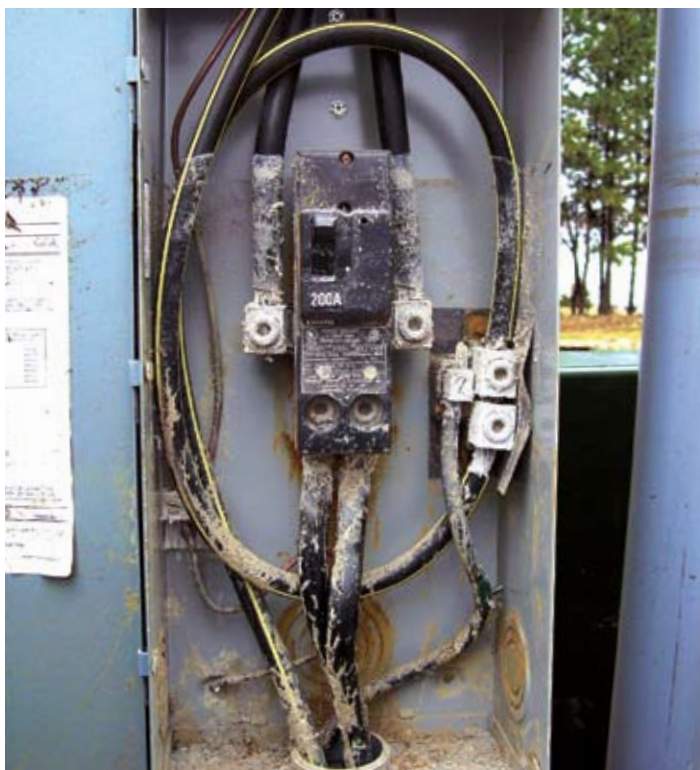
- Do not allow power cord connections to become wet. Do not remove or bypass the ground pin on a three-prong plug.
- Use portable ground-fault circuit-interrupter (GFCI) protective devices to help prevent electrocutions and electrical shock injuries.
- If electrical devices such as circuit breakers, fuses, GFCIs, receptacles, plugs and switches have been submerged, discard them.
- When using a wet-dry vacuum cleaner or a pressure washer, be sure to follow the manufacturer's instructions to avoid electric shock.
- Portable generators emit carbon monoxide (CO), a poisonous gas that is colorless and odorless. For this reason, portable generators should never be used indoors or outdoors near open doors, windows or vents.
- Do not turn on damaged electrical appliances. Electrical parts can pose an electric shock hazard or overheat and cause a fire.

## Replace or Recondition?

Some items may be reconditioned, while others will need to be completely replaced to protect you and your family. It is recommended that you allow an electrician or electrical inspector to guide the restoration or replacement of any electrical wiring or equipment.

Corrosion and insulation damage can occur when water and silt get inside electrical devices and products. Water can also damage the motors in electrical appliances. Therefore, you should be prepared to replace:

- Circuit breakers and fuses
- All electrical wiring systems
- Light switches, thermostats, outlets, light fixtures, electric heaters and ceiling fans
- Furnace burner and blower motors, ignition transformers, elements, and relays for furnaces and hot water tanks
- Hot water tanks



- Washing machines, dryers, furnaces, heat pumps, freezers, refrigerators, dehumidifiers, vacuums, power tools, exercise equipment and similar appliances
- Electronic equipment, including computers and home entertainment systems

## Safety tips for water-immersed Type NM-B nonmetallic-sheathed cable, i.e., Romex®

Type NM-B nonmetallic-sheathed cable (commonly called “Romex®” in the industry) is Listed by UL for use in normally dry locations in accordance with the *National Electrical Code® (NEC®)* under the product category “Nonmetallic-sheathed Cable (PWVX).” General Guide Information for this category can be found in UL’s Online Certifications Directory.



Decades ago, the outer jacket of this cable changed from an impregnated, braided covering to polyvinyl chloride (PVC). In the mid-1980s, the internal conductor insulation went from a temperature rating of 60°C to a 90°C rating, and the required marking was changed from “Type NM” to “Type NM-B.”

The older, braided jacketed version of this cable has less resistance to water ingress than the newer, PVC-jacketed version, and if subject to immersion, such as from flooding, the suitability for continued use is unknown. Any cable of this type that has been subjected to flooding should be replaced without question.

In general, cables with PVC insulation and jacket can withstand immersion in clean water for a short period of time without being damaged as long as the ends are not immersed. If the ends of the cable are immersed for any period of time, however, the internal paper wrapping around the bare equipment-grounding conductor will absorb and transfer the water into the cable assembly. The water may then start degrading the insulation or possibly corrode the conductors. If the cable comes into contact with contaminated water, the contaminants may also act on the insulation or conductors. Over time, failures can occur.

In a flooding situation, there is no way of knowing how long the cables were immersed in water, or what types of potentially corrosive substances may have been in the water that flooded the cables. As was widely reported after Hurricane Katrina, raw sewage and chemicals were known to be in the floodwaters afflicting the Gulf Coast region of the United States. Nonmetallic-sheathed cable has not been investigated by UL for this type of exposure. Therefore, it is not possible for UL to state that cable in a particular installation is acceptable for continued use after having been subjected to the flooding.

The safest approach is to replace any nonmetallic-sheathed cable that was immersed in water for any period of time during the flooding.

The devastation of a flood is enormous. As the contaminated waters recede, there may be even more threats to your personal health and safety. By taking basic precautions, you can help prevent many injuries. IAEI and UL urge you to always put the safety of your family first.



For more information, contact your local electrical inspector or visit [www.iaei.org](http://www.iaei.org)





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## About UL and IAEI



**Underwriters  
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Underwriters Laboratories® is an independent product safety certification organization that has been testing products and writing standards for safety for more than a century.

IAEI's expertise on safe installations for electrical equipment and wiring is vital after a disaster. As a trusted industry source, the association has done training for UL, NFPA, ICC, The Smithsonian Institute, Kennedy Space Center and many jurisdictions.

**For more information about flood water safety,  
go to [www.ul.com/afterthestorm](http://www.ul.com/afterthestorm)**

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