



Air Quality Problems Caused by Floods

How Are Floodwaters an Indoor Air Quality Problem?

During a flood cleanup, the indoor air quality in your home may appear to be the least of your problems. However, failure to remove contaminated materials and to reduce moisture and humidity can present serious long-term health risks. Standing water and wet materials in the home can become a breeding ground for microorganisms: bacteria, mold, and viruses. They can cause disease, trigger allergic reactions, and continue to damage materials long after the flood.

What Are the Health Effects?

Standing water is a breeding ground for microorganisms, which can become airborne and then can be inhaled. When floodwaters contain sewage or decaying animal carcasses, infectious disease is of concern. Even if the water appears clean, microorganisms can cause allergic reactions in sensitive individuals. For these health reasons, and also to lessen structural damage, all standing water should be removed as quickly as possible.

Excess moisture in the home is an indoor air quality concern in several ways:

- Microorganisms in floodwaters may present a health hazard. These organisms can penetrate deep into soaked, porous materials and later be released into air or water. Coming in contact with air or water that contains these organisms can cause illness.
- High humidity and moist materials provide ideal environments for the excessive growth of microorganisms that are always present in the home. These situations may result in additional health concerns such as allergic reactions.
- Long-term increases in humidity in the home can also foster the growth of dust mites. Dust mites are a major cause of allergic reactions and asthma.

How Can I Reduce the Moisture in My Home?

Drying out can take several weeks and microorganisms will continue to grow as long as the moisture and humidity levels are high and as long as there are damp items in the home. Materials such as carpet that cannot be adequately dried out should be discarded. Steps you can take to help reduce moisture in your home include the following:

- Open the doors and windows, especially if the humidity is higher inside than outside of the house.
- Open all closets and cabinet doors to allow the air to circulate. Open drawers as soon as possible because unopened drawers may swell, making it hard to open them when they are dry.
- When the electricity is back on, turn on fans to help air out your home.

- Do not use the air conditioner or the furnace blower if they were under water. You might be blowing contaminants from sediments left from the excessive water.
- Clean or hose out ventilation ducts before using the air conditioner or furnace.
- Use a dehumidifier and/or desiccants to dry out your home.
- If the damage is extensive, you may want to call a contractor who specializes in water extraction.

What Indoor Air Problems Are Caused by Floodwaters?

Asbestos is a mineral fiber commonly used in the past in a variety of building construction materials for insulation and as a fire retardant. Some products that may contain asbestos are pipe and furnace insulation materials; asbestos and cement shingles, siding, and roofing; millboard; resilient floor tiles, the backing on vinyl sheet flooring, and floor tile adhesives; soundproofing or decorative material; patching and joint compound; certain fireproof gloves; and stove pads. However, most products made today and in the past do not contain asbestos. Asbestos can cause lung cancer, mesothelioma (a cancer of the chest and abdominal linings), and asbestosis (irreversible lung scarring that can be fatal). The risk of lung cancer increases with the number of fibers inhaled.

Asbestos, when damaged by a flood, should be repaired or removed by a professional. Repair usually means either covering or sealing the asbestos material. Covering involves placing a protective wrap over or around the material that contains asbestos thereby preventing the release of fibers. Sealing involves treating the material with a sealant that either binds the asbestos fibers together or coats the material so no fibers are released. Repair is usually cheaper than removal, but some repairs may make it more difficult to remove the asbestos later if the need arises.

Biological contaminants are or were living organisms. Common indoor biological contaminants are bacteria, molds, mildew, viruses, animal dander, house dust mites, cockroaches, and pollen. Nutrients and moisture are necessary to support biological growth. A flooded home can contain both of these conditions. Biological contaminants can trigger allergic reactions and asthma, and some can release disease-causing toxins that can damage the liver, central nervous system, digestive tract, and the immune system.

There are several ways to reduce your exposure to biological contaminants:

- Thoroughly clean and dry water-damaged carpets and building materials (within 24 hours if possible) or consider removal and replacement. If your carpet was completely underwater, it should be removed.
- Bleach (1/2 cup to a gallon of water) will remove mold and mildew from bathtubs, walls, floors and many other surfaces.
- Use a dehumidifier to keep relative humidity levels between 30 and 50 percent.

- Maintain and clean all appliances that come in contact with water. Have a professional inspect and clean electrical appliances.
- Change the filters on heating and cooling systems as specified in the manufacturer's directions.

Carbon Monoxide is a colorless, odorless gas that is produced as a result of incomplete burning of carbon-containing fuels such as coal, wood, charcoal, natural gas, and fuel oil. When houses are flooded and occupants are without electricity, people sometimes attempt to use gasoline-powered generators, camp stoves, and lanterns indoors. Using these devices indoors poses serious safety risks and is strongly discouraged. Devices that are designed for outdoor use should never be used indoors. Using these devices can result in high levels of carbon monoxide, which can cause death.

Here are several ways to prevent carbon monoxide poisoning:

- Open flues when fireplaces are in use.
- Do not use ovens and gas ranges to heat your residence.
- Do not burn charcoal inside your home.
- Use proper fuel in kerosene space heaters.
- Use unvented gas or kerosene space heaters only in well-ventilated rooms.
- Never leave a car or any engine running in an enclosed area (such as a garage).
- Use a carbon monoxide detector that meets Underwriters Laboratories Inc. standards, has a long-term warranty, and is easily self-tested and reset to ensure proper functioning.

Lead

Approximately 64 million homes, or 83 percent of the privately owned housing units built before 1980 have lead-based paint somewhere in the building. Nearly one-fifth of these residences are home to families with children under the age of seven. Lead can also come from the solder or plumbing fixtures in the home, fishing lure weights, ceramics, and bullets. A flood in the home can expose the residents to lead from deteriorating paint, contaminated soil, and dust from peeling or chipping paint. Young children are especially vulnerable. Elevated lead levels can cause brain damage, stunt a child's growth, damage kidneys, impair hearing, cause vomiting and headaches, and cause learning and behavioral problems. In adults, elevated lead levels can increase blood pressure, nerve disorders, sleep problems, muscle and joint pain, and mood changes.

You can do several things to reduce your exposure to lead:

- If the paint is not intact, it needs to be inspected for lead, and if it has to be removed contact a qualified contractor.
- Mop floors and wipe window ledges and other areas with an all-purpose cleaner.

- Make sure everyone washes their hands before meals, naptime, and bedtime.
- Keep children away from areas where paint is chipped or peeling. Stop children from chewing on windowsills or other painted surfaces.
- Children should eat a balanced diet with plenty of foods that contain iron and calcium. A child who gets enough of these minerals will absorb less lead.

For More Information

- Asbestos Hotline: 1-800-368-5888.
- Biological contaminants and carbon monoxide: Contact the Indoor Air Quality Hotline at 1-800-438-4318 or the Consumer Product Safety Commission at 1-800-638-2772.
- Floods: Order copies of the American Red Cross/FEMA's *Repairing Your Flooded Home* from the Federal Emergency Management Agency (FEMA), P.O. Box 2012, Jessup, MD 20794-2012, or call their publication warehouse at 1-800-480-2520; or call your local chapter of the American Red Cross and ask for publication number ARC 4477.
- Materials resistant to water damage: Order *Flood-Proofing Regulation*, a manual that lists materials for floors, walls, and ceilings that are resistant to water damage. U.S. Army Corps of Engineers, Attn: CECW-PF, 20 Massachusetts Avenue, NW, Washington DC 20314.
- Food: Contact the U.S. Department of Agriculture Food Safety Hotline 1-800-535-4555.
- Lead: Contact the National Lead Information Center at 1-800-424-5323.