



RIA Flooding Clean-Up Advisory for Restoration Professionals

Hurricanes Harvey, Irma, and Maria are providing restoration contractors with the unique opportunity to assist individuals with wind damage and wide-ranging flooding in multiple states and territories.

Experience from previous storms should not be forgotten as lessons learned after Katrina and Sandy came at a high price and offer invaluable information for restoration professionals responding to flooding across the country.

Health Issues

In every past hurricane and major flood where waters trapped in buildings were evaluated, contaminants were found in levels high enough to impact the health of those exposed to them. As such, any flood waters or water damaged building products being removed as part of a hurricane response effort should be considered contaminated. Without proper Personal Protective Equipment (PPE) restoration workers and volunteers could place themselves at risk from health effects following exposure. While some health concerns may be obvious shortly after exposure, some problems may not manifest themselves for weeks or months.

Injuries and illnesses can include:

- Antibiotic resistant infections (MRSA and other organisms)
- Flesh-eating bacteria
- Intestinal complications
- Respiratory problems
- Exposure to e-coli
- Undiagnosed rashes
- Normal work-related injuries – e.g., falls, vehicle accidents, cuts, bruises

Environmental Contaminants

Due to the variety of contaminants that can be found in the flood waters, proper PPE is crucial for anyone working in the flood-affected areas. There are potential health problems for individuals who have skin contact, accidentally ingest, or inhale any of the contaminants.

Environmental contaminants found in flood waters could include:

- Micro-organisms/Bacteria – e.g., gram negative bacilli from raw sewage or animal feces, fungi, viruses and parasites
- Heavy Metals – e.g., arsenic, beryllium, cadmium, chromium, copper, lead, nickel, silver, zinc
- Diesel Range Organics – e.g., oil (Note: N-95 filtering masks do not provide adequate protection against oil mist.)
- Agro-pollution from Pesticides – e.g., DDT, Chlordane, Heptachlor, non-water soluble organochlorine compounds and fertilizers
- PCBs

What You Should Know

Restoration professionals should be aware that:

- Relief agencies advise that if you haven't been invited to the area, don't go.
- If you do go, preplanning is critical. Most supplies will need to be brought in with contractors – everything from generators, fuel and building supplies to living quarters and food for workers.
- Communication will be difficult, so satellite phones and/or walkie-talkie sets may be necessary.
- Vehicles should be equipped with GPS since many street signs and markers may have disappeared during the flooding.
- Consider using unmarked vehicles (without company logos) to lessen the risk of vandalism or having equipment "misappropriated".
- Don't offer an opinion or expertise that you don't have. If health issues are involved, refer the client to a doctor.

Business Basics

- Establish lines of credit with banks and equipment suppliers before traveling to the damage area.
- Know what licenses and legal requirements must be met by contractors for that jurisdiction.
- Make sure to organize your credentials (e.g., state licenses, certifications, etc.) in a presentable manner.
- Verify that your insurance will cover your company in the jurisdiction where you are working.
- Many homeowners will not have flood insurance, meaning very few will have covered losses. Find out up front who is paying and the payment terms.
- Insurance payments and policies vary – be aware that payments may arrive late or not at all.
- Consider offering a fee-based damage appraisal service.

These items are in no manner all-inclusive, but are designed to provide restoration professionals with the major issues that should be considered or addressed when working in a flood-damaged area.

Cleaning & Safety Procedures

- Be aware of the symptoms of heat stress and keep employees well hydrated.
- OSHA requires proper PPE, not over protection so consider: breathable coveralls, P-100 dust masks and PAPRs which are more comfortable than half-face respirators.
- Train employees on the risks they will encounter and emphasize techniques for proper PPE use. Improve efficiency by training people for specific aspects of the job.
- Document the damage using photos, video and moisture mapping. Keep a daily log. It's hard to remember what happened months after the fact.
- Employ aggressive drying strategies. OSB holds more water than plywood.
- Remove the damaged materials and hose off or power wash the rest.
- Open affected areas – including pulling out base moldings and cabinets.
- In a high humidity situation, high heat is the most effective drying method.

- Plastic-coated electrical wiring can probably be salvaged if cut back to the point of water exposure.
- Fungal growth prefers clean water, so it will not be unusual to find little or no mold growth below the high-water mark. There may be fungal contamination in wall cavities due to water wicking up the walls.
- **Bleach is a destructive and ineffective antimicrobial and should not be used.**
- Treat clothing and textiles with textile compatible conservation treatments.
- Deep contamination requires deep cleaning. Basically, what goes in with water should come out with water. Heavy-duty cleaners and degreasers will be needed in addition to agitation. See the next section for details.

Pittsburgh Protocol

Flood-borne contaminants will impact residents, workers, buildings, vehicles, infrastructure and vegetation. All flood-impacted porous materials should be removed and replaced. Contamination will also be present in semi-porous materials such as studs, sub-flooring and wall sheathing. Any remaining structural components should be thoroughly cleaned following the Pittsburgh Protocol.

The Pittsburgh Protocol was developed in 2004 following Hurricane Ivan and its effects on the Pittsburgh, Pennsylvania, area to deal with mold growth and severe bacterial contamination. There are four basic steps:

1. Work areas should be placed under negative pressure containment or well ventilated with fans, which exhaust outdoors.
2. Thorough removal of large quantities of mud by vacuuming is often impractical. Scrape off heavy deposits of mud. HEPA vacuum loose mold contamination. The remaining mold should be treated with a foam application of an antimicrobial/cleaner.
3. Pressure cleaning with an antimicrobial cleaner will remove the visible contamination and may afford short-term fungistatic protection to surfaces.
4. A highly permeable encapsulant should be applied using an airless paint sprayer to protect the surfaces and inhibit future growth.

For Additional Information

- Restoration Industry Association – www.restorationindustry.org
 - Contractor Orientation to Catastrophic Disaster Work – RIA Technical Assistance Bulletin (click on Contractor Preparation Tips)
 - The ABC's of Returning to Flooded Buildings – FEMA Recovery Advisory
 - Initial Restoration for Flooded Buildings – FEMA Recovery Advisory
- Health Concerns Associated with Mold in Water-Damaged Homes after Hurricanes Katrina and Rita - U.S. Centers for Disease Control and Prevention – www.cdc.gov
- Federal Emergency Management Agency – www.fema.gov
- American Academy of Experts in Traumatic Stress – www.aaets.org

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