



RIA's Hurricane Cleanup Guidelines for Volunteers

In past disasters, volunteers returning from working with the rebuilding efforts have brought more than just the feeling of a job well done with them. Too many who went to help developed health problems that included “mold cold”, infections, antibiotic resistant injuries, meningitis, multi-system reactions such as Chronic Inflammatory Response Syndrome, (CIRS) and even Post Traumatic Stress Disorder (PTSD). The Restoration Industry Association (RIA), the international association of professional restoration and disaster recovery companies, applauds the volunteers and wants to see them return to their homes with a sense of accomplishment rather than health issues.

RIA's experience in dealing with catastrophic disasters worldwide places our members in a unique position to provide information so volunteers can be smart and be safe when assisting with projects in hurricane ravaged areas. In the wake of three major hurricanes, long-term flooding has created a host of contamination problems. Under such conditions improper cleanup can create short-term and long-term problems for both the workers and residents who will reoccupy the damaged structures.



Understand the Dangers

In areas impacted by any sort of natural disaster, there will be a variety of physical hazards that should be recognized by workers. These dangers can include unstable materials, downed power lines, gas leaks, and damaged containers of hazardous household chemicals such as solvents, lawn fertilizers, and pesticides. The working conditions can easily result in slips, cuts and punctures from broken glass, nails, and wood, and cutting dangers from the use of hand and power tools. Because of the conditions and amount of materials being moved, eye injuries are a constant concern.

In addition to visible mold growth that inevitably follows hurricane caused flooding, there are other significant hidden hazards, such as asbestos, facing volunteers. High levels of bacterial growth are common in water-damaged structures. The flooding deposits a variety of heavy metals such as lead and mercury into porous building materials. Because of the termite infestations and mosquito control programs in areas damaged by the hurricanes, significant levels of pesticide residues have been liberated, particularly around older houses. The damage to oil refineries and storage locations left many neighborhoods with visible residues. There are also airborne particulates that may be unseen by the human eye, but can still cause illnesses when inhaled.

As with past hurricanes these hazards typically result in a large number of documented reports of antibiotic resistant infections, Legionella-caused pneumonia, and a host of low grade but persistent symptoms. The dramatic rise in sinus infections, skin rashes, upper airway irritations, and persistent coughing is a sad fact for many hurricane volunteers.

Health Hazards: Physical and Emotional

Structures unoccupied for extended periods often become the new homes for vermin such as snakes, rats, fire ants, and bees. The risk of animal bites, insect stings, and exposure to noxious plants such as poison ivy is very real in all of the areas impacted by the hurricanes.

There are also long-term hazards to occupants if cleanup does not include proper decontamination of surfaces prior to rebuilding. Occupants of buildings improperly restored following the Mississippi River flooding of the 1990s suffered a host of respiratory and physical ailments that began to surface months and years after the rebuilding. These findings were buttressed in 2004 by the Institute of Medicine when their doctors reviewed the literature regarding health outcomes related to damp indoor spaces.

Finally, volunteers must be prepared for the psychological shock that can result from a combination of stark visual images and physical exhaustion. Cleanup and restoration work in an area that has suffered the devastation caused by multiple large hurricanes takes an emotional as well as a physical toll on workers.

Post traumatic stress disorder (PTSD) is defined as a specific set of symptoms arising from a markedly distressing event. Individuals exposed to victims of a trauma may also develop a unique form of PTSD even though they were not directly impacted by the event. This secondary PTSD is sometimes referred to as compassion fatigue and can affect an entire team after first appearing in one team member.

Marilyn Neudeck-Dicken, Ph.D., an expert in the area of traumatic stress, says the feelings of helplessness from seeing the devastation are normal. She recommends that volunteers keep a journal of their experiences and feelings to give them an outlet to express those emotions. A debriefing session for volunteers with a professional experienced in traumatic stress disorder is also recommended to help them deal with the powerful emotions. The American Academy of Experts in Traumatic Stress (www.aaets.org) can provide more information about local critical incident stress debriefings.

Here are some things she says to keep in mind about stress:

- How one looks at life can affect the reaction to stress
- Cumulative stress affects an individual's biological, psychological and social functioning
- Every team needs a support system – e.g., clergy, family, community
- Knowing the victims can intensify stress
- Stress management needs to be ongoing, particularly for a team – e.g., meditation, prayer, relaxation, exercise

Preparation and Prevention

After every major hurricane power takes time to be restored to large areas. Dependable sources of clean water are not guaranteed. Sewer systems may not be functional in many communities. With this in mind, the basics need to be considered.

- Where are you going to stay?
- Where will you shower?
- How are you going to eat?
- How will you travel around the area?
- How will you manage the work?
- Who are you partnering with after you arrive?

Volunteers heading into any area should partner with local organizations or churches, since they can provide assistance in navigating the area, securing resources and identifying hazards.

Any individuals conducting cleanup work should also have appropriate immunizations. Although a final determination must be made by a physician, many public health organizations recommend that hurricane relief volunteers have: **tetanus boosters, immunizations against Hepatitis A and B, typhoid, and meningitis.**

Despite a desire to assist in this worthy activity, certain individuals should carefully consider whether they are able to volunteer effectively. Individuals with pre-existing health concerns such as asthma/allergies, heart problems, previous back injuries, compromised immune systems, or open cuts or wounds should explore other ways to help with the rebuilding rather than physically doing it themselves.

Personal Hygiene

Workers should be coached in personal hygiene, specifically: avoid scratching uncovered skin and putting fingers in ears and mouth or rubbing eyes. Eating and drinking can be especially hazardous. Careful washing of hands and face should precede ingestion of any kind. (Your own perspiration can be toxic!)

When heading into a hurricane-damaged area, RIA recommends bringing:

- First aid kits
- Antibiotic ointment for scrapes and wounds
- Baby wipes
- Hand sanitizer (small individual bottles and bulk sized for refilling)
- Personal hygiene items – e.g., shampoo, soap, deodorant, toothpaste

- DEET-based mosquito repellent
- Over-the-counter anti-itch creams for insect bites
- Diarrhea medication
- Sunscreen
- Energy bars
- High protein foods (e.g., tuna, sardines, peanut butter)
- Gatorade or other sports drinks

Protective Gear and Practical Tools

The importance of proper personal protective equipment (PPE) cannot be underestimated. RIA recommends that volunteers involved in demolition or reconstruction wear:

- Safety shoes, work boots or rubber boots with steel toes and shanks (not running or tennis shoes)
- Leather work gloves (form fitting, not oversized)
- Eye protection (e.g., goggles or safety glasses)
- Rubber gloves for cleaning or when using sanitizing chemicals (disposable nitrile gloves that are puncture resistant and non-allergenic)
- Hard hats
- Appropriate respiratory protection

Respiratory protection is mandatory given the conditions. Simple dust masks are clearly inadequate given the documented hazards that the volunteers face. Respirators with HEPA cartridges or dust masks with an N-95 or N-100 rating should be used by any workers restoring hurricane damaged structures.

Full body coverings that are water and dust resistant are also a key piece of protective equipment which will have to be used inside most structures until the demolition and decontamination activities are completed.



Gathering the proper tools to remove contents, muck out buildings, demolish interior surface materials, and decontaminate structural members is also important. Some tools to consider bringing to the work sites include:

- Pry bars
- Shovels
- Flashlights (with extra batteries)
- Tool belt
- Razor knives
- Saws
- Hammers
- Cleaning supplies for salvageable items (i.e., potable water, cleaners/sanitizers, buckets, wiping rags, spray bottles, etc.)
- Wheelbarrow
- 5-gallon buckets (outfitted with pouches for holding tools)
- Garbage cans
- Rechargeable power tools
- Tarps

Because of the recommendations by FEMA for proper cleaning of structural supports, each volunteer team should consider assembling and transporting a simple pressure washing rig.



These units can be constructed from:

- A drum dolly
- Small pressure washer
- 55 gallon drum
- Misc. plumbing

Basic Cleanup Procedures

Many hurricane damaged structures have surface contamination such as visible mold growth above the high water mark. There are also problems where waterborne contaminants have penetrated porous materials below the high water mark. Studies by the EPA and FEMA report that significant contamination was detected outside and inside wall cavities, so many structures will have to be gutted in order to be saved.

Despite the wide publicity given to bleach as a sanitizing agent for use after flooding, the FEMA recovery advisories produced after Hurricane Katrina area break that pattern. Bleach is not recommended for wholesale decontamination of structures because it:

- is not a good cleaner
- is deactivated by soil and organic matter
- reacts with other chemicals
- is corrosive

The recommended approach to the cleanup and decontamination of structures impacted by rain damage, storm surge or floodwaters involves six steps:

Step 1

- Plan your removal area to avoid blocking access or having to move things twice.
- Remove the contents from the damaged areas of the structure
- Sort salvageable items from those for disposal
- Contents made of porous materials saturated by floodwaters and/or showing visible mold growth should be disposed of (e.g., upholstered furniture, draperies, carpeting, bedding, books, papers, clothes)

Step 2

- Remove gross contamination as soon as the rooms have been cleared of the contents
- With reports of an increase in problems related to Legionella bacteria, it is recommended that surfaces with flood residue be sprayed with an antimicrobial solution before workers begin the removal of gross materials such as mud and saturated carpet

Step 3

Isolate non-impacted areas using heavy gauge plastic (6-mil or thicker) over the openings and vents that connect the non-damaged areas and work zones.

Step 4

Removing large quantities of finish materials is often necessary. This includes cabinets, counters, desks, walls and ceilings that have been damaged beyond repair. Even if cabinets can be cleaned, dried and saved, they should be removed from the walls so water-damaged drywall or plaster can be replaced.

Recommendations during tear out:

- Remove wet carpet, padding, and tack strips. Wear leather gloves to protect hands from puncture wounds while removing and handling tack strips. Removing wooden baseboards prior to carpet tear out may allow for their later reinstallation if they have not been water-damaged.
- Remove any curled vinyl tiles or linoleum over concrete floors. All vinyl tiles and linoleum over wooden sub-floors should be removed to allow the wood to dry. Respiratory protection should be utilized for this work as many older (pre-1970s) flooring products often contain asbestos.

- If drywall or plaster has been saturated by contaminated floodwater, it should be removed. Respiratory protection should be worn when removing drywall since some older drywall joint compound contains asbestos. If the water level was less than 2½ feet high, the wall material should be removed two feet above the obvious damage. If the water level was greater than 2½ feet, the wall material should be removed to a height of 8 feet or the ceiling junction, whichever is higher. Wall paneling should be removed if it is swollen or if saturated drywall is behind the paneling.
- Electrical outlet and wall switch plates and door and window moldings must be removed prior to the removal of the wall material. Flooded electrical receptacles should be removed completely after the appropriate circuit breakers or fuses are deactivated.
- Fibrous wall insulation (fiberglass, mineral wool, cellulose, wood fiberboard, etc.) saturated by floodwater should be removed completely. Foam plastic insulation may be left in place and allowed to dry.
- Use caution when utilizing fans or other air movers to dry out a space, since the air movement could spread the mold contamination to other areas of the structure.

Step 5

The most efficient method for cleaning and decontaminating materials and surfaces involves using a residential-style pressure washer or commercial foam generator to apply a cleaner-disinfectant solution to the affected areas. Brushes improve decontamination of floors and wall studs by scrubbing solution into affected surfaces. Following the first cleaning, floors and wall studs should be rinsed with water and the cleaning process repeated. Squeegees can be used to control or direct spent solution and wet vacuums can be used to collect spent solution.

The steps recommended to decontaminate the remaining structural support members are:

- Clear rinse with clean water
- Foam or pressure wash with cleaner-disinfectant
- Agitate with brush
- Clear rinse with clean water



Step 6

Once the cleaning process is completed, the building and any remaining contents need to dry. Drying of structural materials will take an extended period of time to return to pre-flood conditions. Exterior rooms with excellent ventilation can take two to four weeks to dry, depending on the temperature and humidity outside. Interior rooms or those with minimal ventilation can take four to six weeks or more to dry and are candidates for the use of mechanical drying equipment. The use of fans, dehumidifiers, air conditioners, and/or auxiliary electric heaters will speed drying. Allowing materials to dry naturally will take considerably longer.

Warning: Failure to allow adequate drying prior to reconstruction can trap moisture in the building, which can cause structural damage and potential health problems in the future.

Stay Safe

With three hurricanes impacting the US in the space of a few weeks the demand for the assistance of thousands of volunteers is great so safety and security cannot be overemphasized.

- All work groups should coordinate their efforts with local law enforcement agencies so that sudden bursts of activity are not mistaken for criminal actions.
- Volunteers should never enter a structure where there is evidence of structural damage such as sagging ceilings, large wall or floor cracks, or walls out of plumb.
- Because of the variety of contaminants identified in hurricane damaged structures, always wear personal protective equipment, despite the heat and the fact that such protection may be uncomfortable. Use of such safety devices is also important for all activities that require entry into damaged structures, regardless of the amount of time an individual may be inside. Even spending a short amount of time in a mold infested building can result in serious diseases such as Organic Dust Toxic Syndrome. In the wake of past hurricanes the Centers for Disease Control (CDC) determined that 46% of inspected homes had visible mold growth, and that residents and remediation workers did not consistently use appropriate respiratory protection.
- Because of the physical demands of the labor and the extra stress on the body that occurs with the use of protective equipment, volunteers should take frequent breaks away from the work area.
- All volunteers should frequently use hand and face washing supplies/facilities. No food or water should be consumed using dirty hands.
- Work team leaders must plan for proper hydration by having plenty of bottled water and other liquids available for volunteers.

Working in any hurricane damaged area involves real dangers for all involved. Education and proper preparation can help reduce the chances of injury or illness.

More Information

- Restoration Industry Association – www.restorationindustry.org (click on Referrals then Clearinghouse)
 - 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
- American Academy of Experts in Traumatic Stress – www.aaets.org
- Marilyn Neudeck-Dicken, Ph.D., traumatic stress expert, e-mail: drmend2@yahoo.com or phone (909) 887-2991

Acknowledgements

RIA would like to thank the following individuals who contributed their time and expertise to the initial development of this advisory in 2012: Michael Pinto, CSP, CMP, Wonder Makers Environmental, Inc.; Martin L. King, CR, ASA, Martin Churchill Associates; Frank Headen, CR, WLS, CMH, First Restoration Services, Inc.; Rusty Amarante, CR, BELFOR USA; Larry Holder, CR, BELFOR USA; Cliff Zlotnik, CR, WLS, CMH, Unsmoke; and Marilyn Neudeck-Dicken, Ph.D., B.C.E.T.S, D.A.A.E.T.S., F.A.A.E.T.S, Board Certified expert in Traumatic Stress. The 2017 revision was undertaken by the RIA's Environmental Council, chaired by Michael Pinto.

The Restoration Industry Association, with offices in Washington, D.C. and Chicago, IL, is the only international trade association in the cleaning and restoration industry. Its national and international member firms specialize in cleaning, treating, and repairing damaged buildings and their contents. More information is available on the RIA website: www.restorationindustry.org.

Photos courtesy of FEMA, Wonder Makers Environmental, Inc. and Unsmoke.