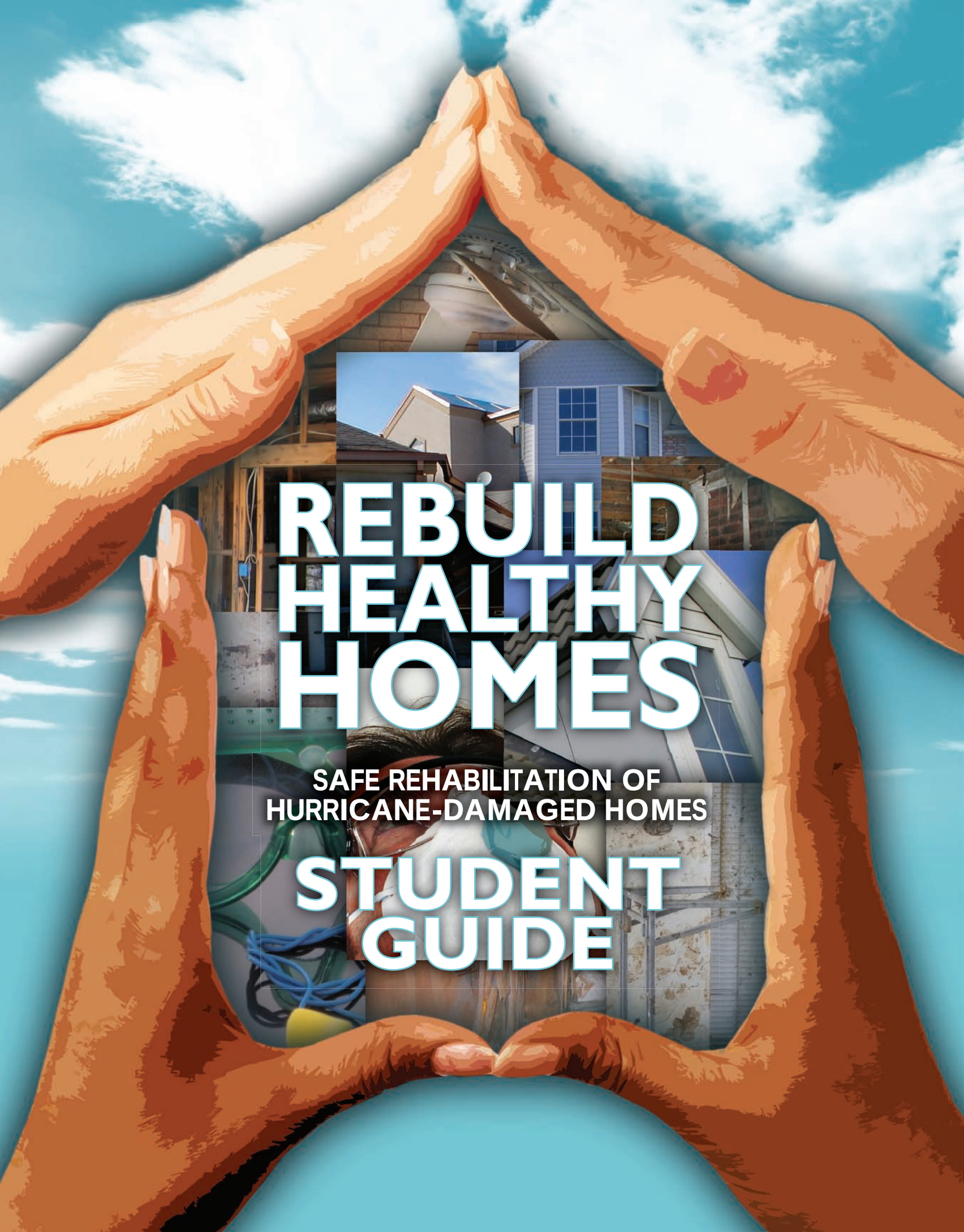

REBUILD HEALTHY HOMES

SAFE REHABILITATION OF HURRICANE-DAMAGED HOMES

STUDENT GUIDE

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LESSON 1

Assessing the Damage

What should I look for when assessing hurricane-damaged homes?

Objectives:

After completing this lesson, you should be able to:

- Recognize the potential hazards of hurricane-damaged dwellings with structural damage.
- Identify potential safety and health hazards.
- Determine if the services of professionals are needed.

Basic Safety Inspection

Structural Flaws

1 **What should I look for?**

Most dwellings that suffered structural damage will show distinctive outward signs. Never enter a building that you suspect has structural damage. Structural damage is usually evidenced by:

- Roofs that sag in the middle or at the ends due to load-bearing walls that have shifted.
- Walls that are not vertical or straight.
- A shift in the dwelling where the structure meets the foundation.
- Cracks in the masonry exterior of the building.

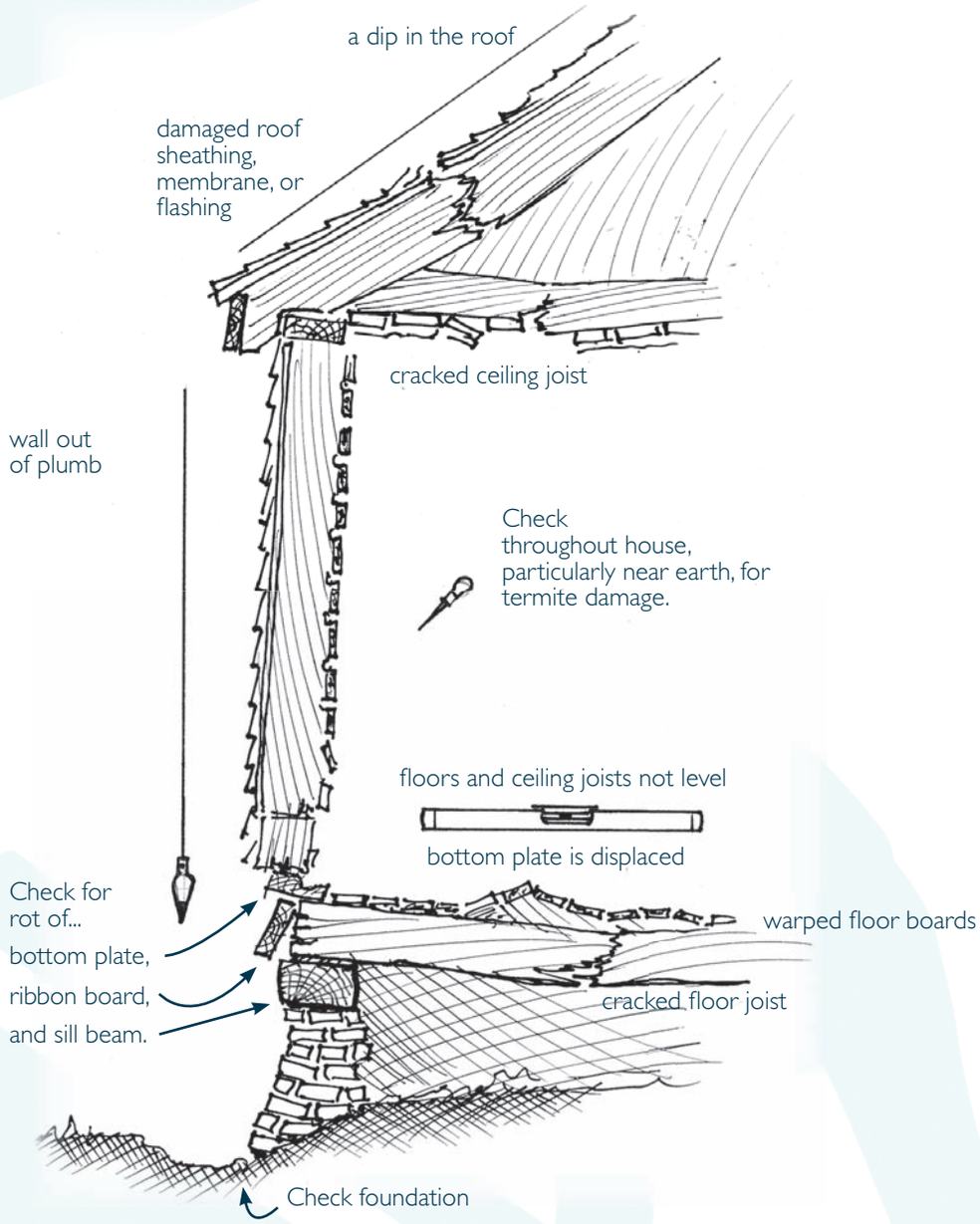
2 **What should I do about it?**

Homes in the New Orleans area that were affected by Hurricanes Katrina and Rita have been or will be reviewed by the Department of Safety and Permits. A damage inspection rating was or will be assigned. The ratings are:

- GREEN: Building is safe to enter and lawful occupancy is permitted.
- YELLOW: Building has partial structural damage and/or falling non-structural hazards may be present. Building may or may not be habitable; partial occupancy is permitted per noted restrictions.
- RED: Building is unsafe to enter and its occupancy has been prohibited by the local building department. The building is structurally unstable and may collapse from static conditions, wind, or other events.

Structural Flaws

Helpful Hint:
Never enter a home that has structural damage.



If the dwelling you are rehabilitating has not been inspected, call the City of New Orleans Department of Safety and Permits, which may be reached at 504-658-7130, or visit the website at *http://www.cityofno.com*

If you live outside of the New Orleans area and your home has not been inspected, contact your local department of Safety and Permits office immediately.

3 Should I bring in a professional?

Never enter a hurricane-damaged dwelling you suspect has structural damage until it has been inspected by a licensed professional building inspector.

Electrical and Natural Gas Lines

Helpful Hint: Remember to turn off all electricity at the box.

1 What should I look for?

If the power supply to the electrical equipment is not grounded or the path has been broken, electrical shock may occur.

- Make sure that no live electric lines are on the property or in the house.
- Ensure that the gas line entering the home is turned off.
- Confirm that all electric and gas services are turned off.

2 What should I do about it?

- Visually inspect electrical equipment before use and take any defective equipment out of service.
- Disconnect all main switches and circuits.
- Unplug appliances and lamps, remove light bulbs, and cover plates of wall switches and outlets that got wet.
- Ground all power supply systems, electrical circuits, and electrical equipment.
- Do not remove ground prongs from cords.
- Avoid standing in wet areas when using portable electrical power tools.
- If you smell gas in the dwelling you are working, immediately shut down, leave the dwelling, and call the local utility company.

3 Should I bring in a professional?

If the electrical system has not been inspected, have a licensed electrician inspect your service before using it. Make sure that the electrician checks for grounds and unsafe conditions before reconnecting the system. If the natural gas system has not been inspected, have the utility company inspect your service before using it.

Heating, Ventilation, and Air-Conditioning Systems (HVACs)

1 **What should I look for?**
Determine if the heating and air conditioning systems were flooded. Look for any signs of mold growth.

2 **What should I do about it?**
If the systems were flooded and there are signs of mold growth or rust, it makes a noise or emits an odor, or it sparks when turned on, do not use the system until a licensed HVAC professional has inspected it. Complete cleanup should include the following steps:

- Remove all flood-contaminated HVAC filter media and insulation surrounding and within HVAC system components.
- Clean flood-contaminated HVAC system components with a wet-dry high efficiency particulate air (HEPA)-filtered vacuum cleaner to remove dirt, debris, and microorganisms.
- Disinfect all HVAC system component surfaces while the HVAC system is not operating. Disinfection procedures should be followed with a clean water rinse.
- After cleaning and disinfecting the HVAC system components, have the insulation replaced and system thoroughly evaluated by a qualified professional to evaluate its performance and correct it as necessary.

Before the dwelling is occupied, the HVAC system should be operated continuously in a normal manner at a comfortable temperature for 48 to 72 hours.

3 **Should I bring in a professional?**
A HVAC professional should inspect, clean, and decontaminate the HVAC systems.

Basic Health Inspection

Mold

Helpful Hint: Fix all moisture and water problems.

What should I look for?
Homes that were flooded may contain mold. Signs of a possible mold problem may include a musty or earthy smelling odor, staining, discoloration, and fuzzy growth on the surface of building materials and furnishings. Mold may appear as cottony, velvety, granular, or leathery growth and may range in colors from white to black.

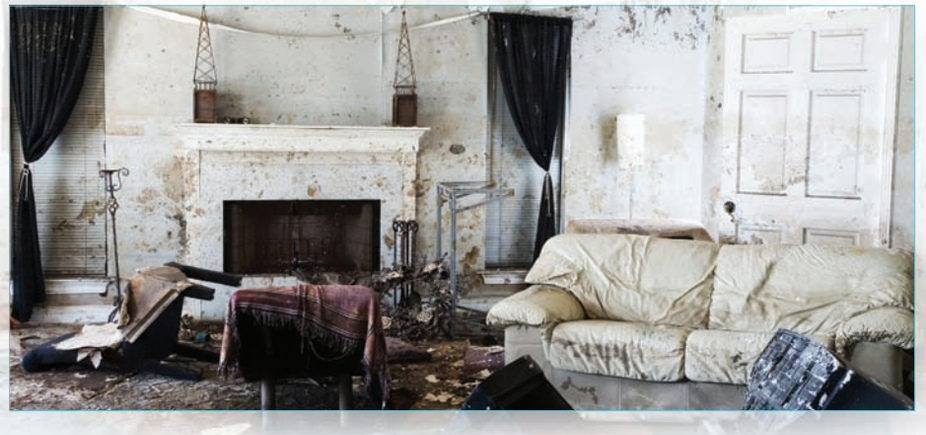
- Locate areas of excess moisture and water damage.
- Look for visible signs of mold growth.
- Investigate areas with noticeable mold odors and search behind and underneath materials such as carpet and pad, wallpaper, drywall, vinyl flooring, and sink cabinets; these may be areas with hidden mold growth.

2 **How may my family or I be exposed to mold or mold spores?**
It is important to remove mold from the home because contact with mold may cause health problems and allergic reactions, which may include sneezing, runny nose, red/watery eyes, skin rash, coughing, and nasal and sinus congestion. It may also cause asthma attacks in people with asthma. It may also cause fatigue and flu-like aches and pains, lower resistance to illnesses, and other health problems.

Mold

Helpful Hint:
Even dead mold spores can cause allergic reactions.

- Identify and fix all moisture and water problems. Common indoor moisture sources include flooding, condensation, roof, window and plumbing leaks, and inadequate venting in kitchens and bathrooms.
- Begin drying all wet materials by using fans and dehumidifiers. Move all wet items away from walls and off floors. Dry items in the sun if possible.
- Remove and dispose of mold contaminated materials. Porous items that have absorbed moisture and have mold growing on them should be removed, bagged, and thrown out. Porous items include sheet rock, insulation, plaster, carpet, ceiling tiles, and wood and paper products. Non-porous materials with surface mold growth may be saved if they are cleaned well and kept dry. Non-porous items include hard plastic, concrete, glass, metal, and solid wood.

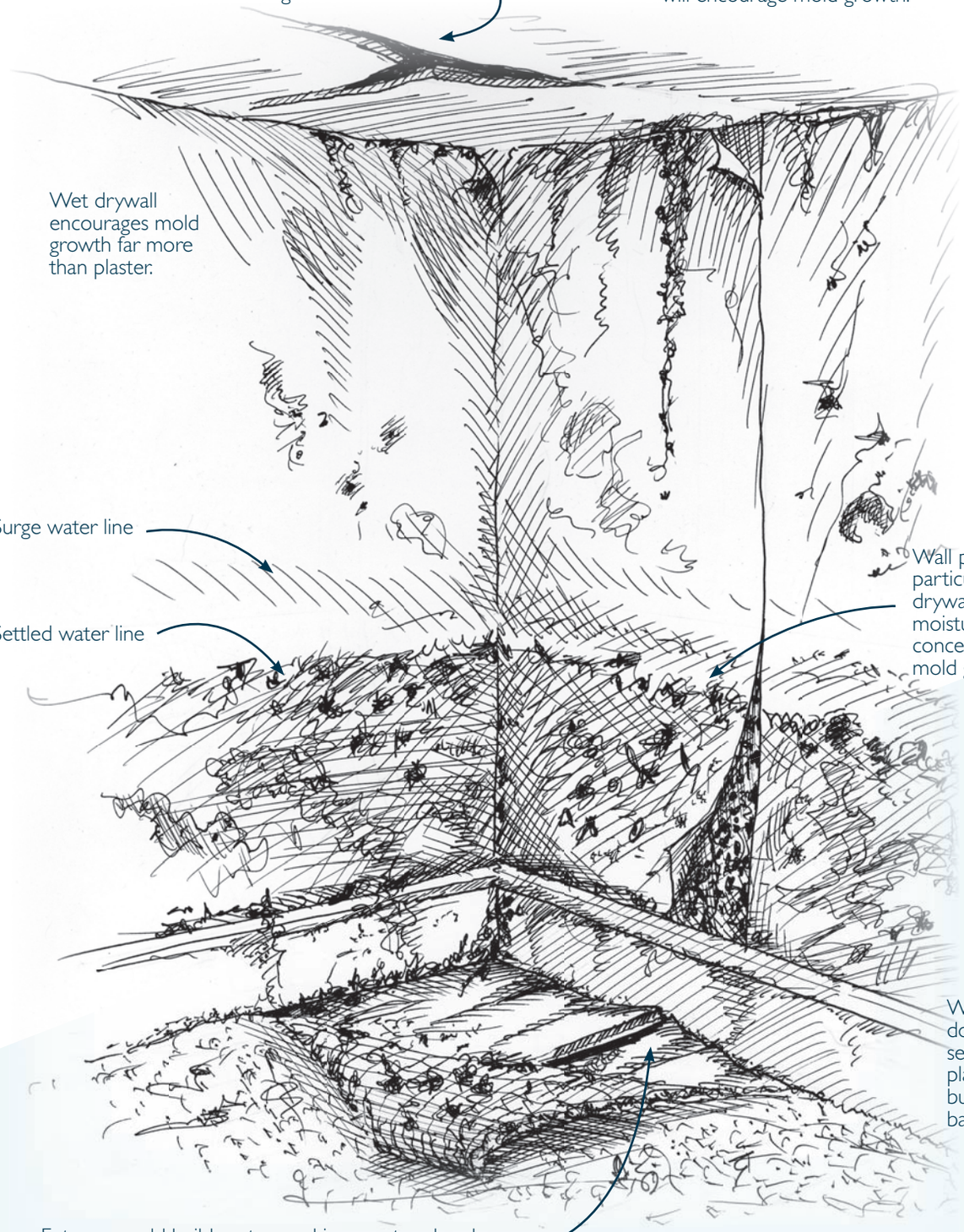


- To clean surface mold growth off non-porous materials, thoroughly scrub all contaminated surfaces using a stiff brush, hot water, and a non-ammonia soap or detergent. Collect excess cleaning liquid with a wet/dry (HEPA) vacuum, mop, or sponge. Rinse the area with clean water and collect excess rinse water.
- After removing all visible mold from contaminated surfaces, a disinfectant may be used to kill mold missed by cleaning.
- Continue to look for signs of moisture problems or return of mold growth. If mold returns, repeat cleaning steps and consider using a stronger solution to disinfect the area again. Re-growth may signal that the material should be removed or that moisture is not yet controlled.

3 Should I bring in a professional?

If the moldy area is less than 10 square feet, in most cases you can handle the job yourself. However if there is a lot of water damage, and/or mold growth covers more than 10 square feet, you may need to hire a professional.

Mold Growth


Evidence of roof damage, which can cause continued wetting of upper walls and ceiling, leading to mold build up, ceiling damage, and eventual structural damage.
High indoor humidity, particularly hot showers, and condensation in the wall cavity due to temperature differences, will encourage mold growth.
Wet drywall encourages mold growth far more than plaster.
Surge water line
Settled water line
Wall paper, particularly on drywall, traps moisture and concentrates mold growth.
Water running down studs and settling on bottom plate leads to mold build up behind base board.
Extreme mold build up trapped in carpet and pad prevents floor from drying out and causes warping.

Lead-Based Paint

Helpful Hint: If you do not know the age of the home, assume it has lead-based paint.

1 What should I look for?

If your home was constructed prior to 1978, it may contain lead-based paint. The most common source of lead poisoning is from the ingestion of contaminated dust and soil. In hurricane-damaged homes, these problems could occur from peeling paint due to water damage.

- In adults, lead poisoning may cause high blood pressure, fertility problems, digestive problems, joint pains, and memory problems.
- In children, lead poisoning may cause learning disabilities, behavioral problems, stunted growth, mental retardation, coma, and even death.
- In pregnant women, lead poisoning may cause miscarriages, premature births, and stillbirths.

2 What should I do about it?

The following recommendations should be followed if your home contains lead-based paint:

- Avoid high-risk practices, which may create excessive dust or fumes.
- When working on painted surfaces, use the following safe work practices:
  - **a.** Cover all areas that might be contaminated by paint debris with plastic sheeting.
  - **b.** For scraping surfaces, use wet method. Spray and keep the surface moist.
  - **c.** If you use a power sander, you must use a HEPA filter vacuum attachment.
  - **d.** Wet mist the area prior to drilling and cutting.
  - **e.** Minimize pounding and hammering (pry and pull instead).
  - **f.** Enclose all lead-based paint materials in plastic bags before carrying them through the home.
  - **g.** Damp clean the entire work area to pick up settled dust.
  - **h.** Wear the appropriate Personal Protective Equipment (PPE). (See page 26)

3 Should I bring in a professional?

Use a state certified inspector/risk assessor to determine if lead-based paint is present.

Asbestos

1 **What should I look for?**
Homes that were built or renovated before 1970 may contain asbestos.

- Asbestos is most commonly found in insulation used in and around pipes, furnaces, and boilers. It can also be found in vinyl asbestos floor tile, floor coverings and mastics, sprayed-on ceiling insulations, roofing shingles, felts, and tars and siding shingles. If you are unsure of the age of your home, assume it may contain asbestos.
- Exposure to asbestos fibers may increase the risk of lung cancer and mesothelioma, a rare cancer in the lining of the chest and abdominal cavity. Asbestos exposure may also increase the risk of asbestosis, a form of lung disease that can cause shortness of breath, coughing, and lung damage. Symptoms of asbestos-related diseases may not become noticeable for many decades.

2 **What should I do about it?**
If the asbestos material is in good condition and has not been disturbed, it can be left alone. If it is a problem, there are two types of correction: repair or removal.

- Repair usually involves either sealing or covering asbestos material and keeping the asbestos in place. It is usually cheaper than removal, but it may make future removal of asbestos more difficult and costly.
  - **a.** Sealing (encapsulation) involves treating the material with a sealant that either binds the asbestos fibers together or coats the material so fibers are not released. This should be done by a professional trained to handle asbestos safely.
  - **b.** Covering (enclosure) involves placing something over and around the material that contains asbestos to prevent the release of the fibers.
- When removing asbestos containing materials the following precautions should be taken to minimize health risks:
  - **a.** When stripping, remove whole pieces or ensure that the fragments are as large as possible.
  - **b.** Wet the materials that are being removed.
  - **c.** Do not use a vacuum cleaner to pick up the dust unless it is a HEPA vacuum cleaner made for asbestos removal.
  - **d.** Never sand asbestos containing materials.
  - **e.** Always wear the appropriate PPE. (See page 26)

3 **Should I bring in a professional?**
It is recommended that asbestos be repaired and/or removed by a certified professional.

III Selecting Qualified Contractors

1 Where can I find a qualified contractor?

- Hire only Louisiana state licensed contractors.
- For a list of qualified contractors, call 1-866-310-7879 or visit the website *www.lslbc.state.la.us/findcontractor.asp*
- Check with your insurance company for referrals.

2 What should I look for or require from a contractor?

- Ask each contractor to give at least three references on similar jobs.
- Get in writing the estimated start and completion dates and the total amount to be paid when the work is done. If possible, get quotes from at least three contractors.
- To get the most protection, ask the contractor to provide proof that the contractor has commercial general liability and contractual liability insurance.
- Investigate the contractor's background and check to see if their references were satisfied.

3 What should I avoid when hiring a contractor?

- Do not hire contractors who recommend fogging or spraying as the method to clean up moldy materials.
- Avoid door-to-door solicitators that offer work.
- Stay away from contractors who push for an immediate decision about work, which makes it impossible for homeowners to get competitive bids, check licenses, and review references.
- Do not sign anything until you understand the terms of your contract clearly.
- Make sure that you have a written agreement, not just a verbal agreement.
- Never pay more than 10% or $1,000, whichever is less, of the total cost down at the beginning of the job.
- Do not let the payment schedule get ahead of work completed. Keep a record of all payments.
- Do not make the final payment until you are satisfied with the job.
- Never pay cash.

Lesson Summary *You should now able to:*

1 **Recognize the symptoms of structural damage.**

- **a.** Structural damage often shows very distinctive outward signs.
- **b.** Structural damage must be fixed prior to addressing surface damage.

2 **Identify potential safety and health hazards.**

- **a.** Turn off all electricity and gas service prior to beginning work.
- **b.** Assume that the building is contaminated if there are signs of water damage or mold and/or if there is a strong moldy smell.
- **c.** Homes built prior to 1978 may contain lead-based paint.
- **d.** Asbestos that is in good condition and has not been disturbed can be left alone. However, if there is a problem, asbestos should be either repaired or removed by a professional.

3 **Determine if the services of a professional are needed.**

- **a.** Moldy areas greater than 10 square feet may require the help of a professional.
- **b.** Hire professionals for the removal of asbestos materials and lead-based paint.
- **c.** Hire only state licensed contractors.

Notes:

LESSON 2

Creating a Work Plan

What should I do prior to beginning work on hurricane-damaged homes?

Objectives:

After completing this lesson, you should be able to:

- Identify which items to include in a cleanup station.
- Set up a containment area.
- Determine which Personal Protective Equipment (PPE) you will need.

Before Work Begins

Supplies and Materials

What should I do about supplies and materials?
Make a list of all the supplies and materials that you will need and purchase them ahead of time. See Appendix 1 for a list of recommended supplies and materials. Most supplies and materials can be purchased at any hardware store.

Electricity

Helpful Hint: Set up portable generators outside the house.

What should I do about electrical systems?

- If the electrical system was flooded and there are no other electrical sources nearby, set up portable generators outside your home.
- Do not set up generators inside your home; they may create a carbon monoxide hazard.
- If your home has electricity, have an electrician install a GFCI outlet box and shut off all other electricity.

Storage Areas

What should I do about storage areas?

- Determine how much storage space you will need for belongings that you are saving. If those items cannot be stored at the work site, make plans for moving and storing them at another location. Items that have been contaminated by mold must be cleaned before they are placed into storage.
- Set up a secure tool area to keep your tools and equipment safe.

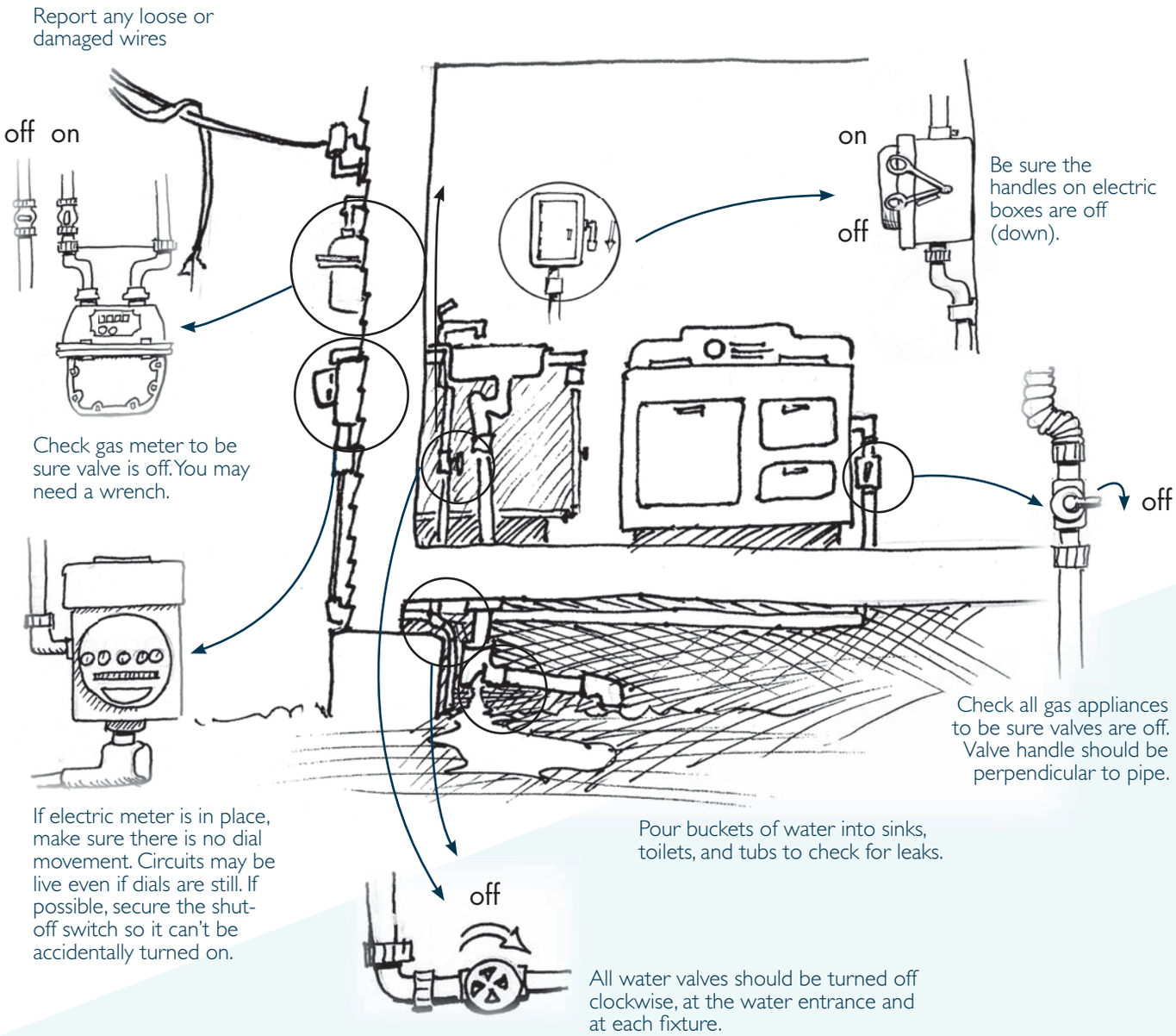
Disposal

What should I do about the disposal of furnishing and building materials?

- Make sure that the debris you remove from your home is disposed of properly. If your community does not pick up debris that is left on the curb, make plans to rent a dumpster or have a contractor haul the waste away.
- Do not let construction debris accumulate.
- Consult your local Department of Sanitation for local regulations.

Utility shut-off

Before entering the building to work, check utility safety and report apparent problems to the appropriate agency.



Site Set-up

Everyone needs to take some basic precautions.

Don't smoke. If you must smoke, leave the work site.

Don't eat on the work site or drink water in the work area.

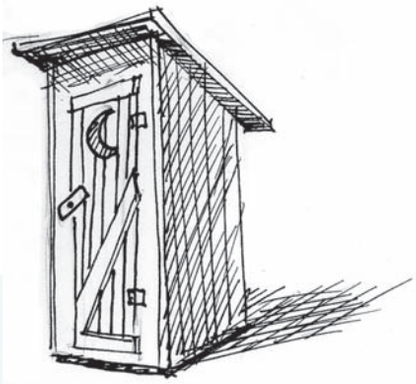
Don't touch or rub your eyes.

Always pull or bend over nails.

Protect yourself from direct sun and heat stroke. Take breaks, drink water, and use fans where possible.

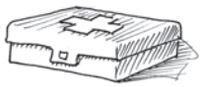
It is critical to drink water frequently.

All work sites should have access to:



a toilet

water for washing



a first aid kit

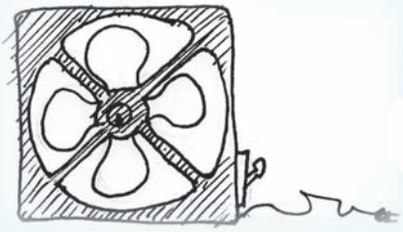
water to drink

a cool, clean, comfortable place to take breaks

...and if possible, access to electric outlet or generator for:

power tools

Use hand tools when you don't need production speed.



ventilation

Air movement keeps you cooler and healthier.

light

A well-lit work site is a safer work site.

Cleanup Station

Helpful Hint: Make sure that you have a current tetanus shot.

1 Why do I need a cleanup station?

The cleanup station will be used by workers as a place to wash up before taking a break and at the end of the day before going home. In hot weather, it is important for workers to take breaks every hour to avoid dehydration and heat stress. The cleanup station will also be used as an area to treat minor accidents, such as cuts and punctures.

2 Where should I set up a cleanup station?

The cleanup station should be set up outside of the home. However, if you must set it up indoors, set it up in a clean area of the house that is separated from the work areas.

3 What should I include in my cleanup station?

Each cleanup station should include:

- A first aid kit
- Several cleanup buckets and a stiff brush
- Soap
- Hand sanitizer
- An eye wash station
- A list of emergency phone numbers
- Bottled drinking water
- Paper towels
- Trash bags

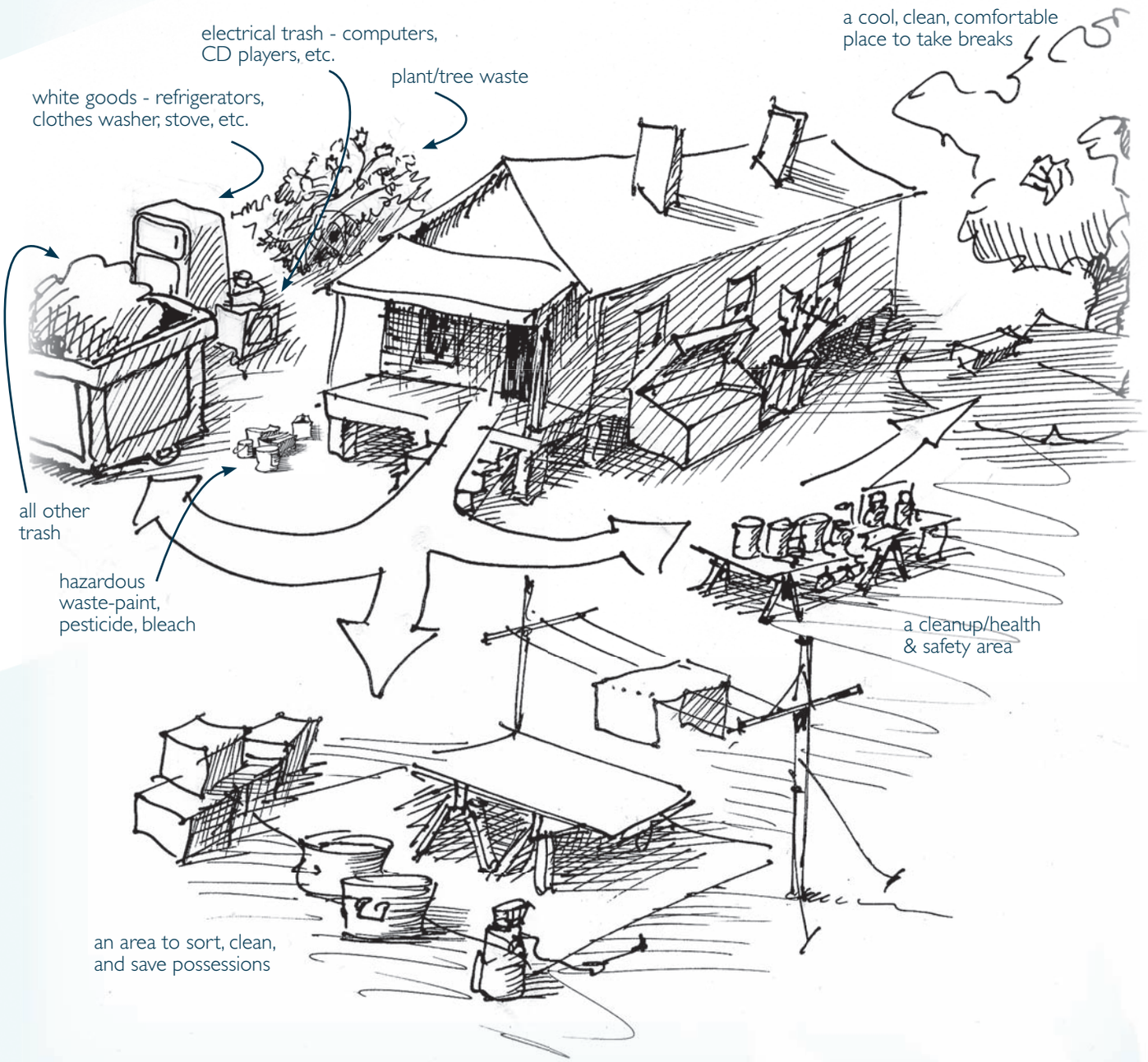
CAUTION: *Heat Stress*

Heavy physical work in hot, humid environments can cause heat stress in workers. Hot and humid conditions can occur either indoors or outdoors. Protect yourself.

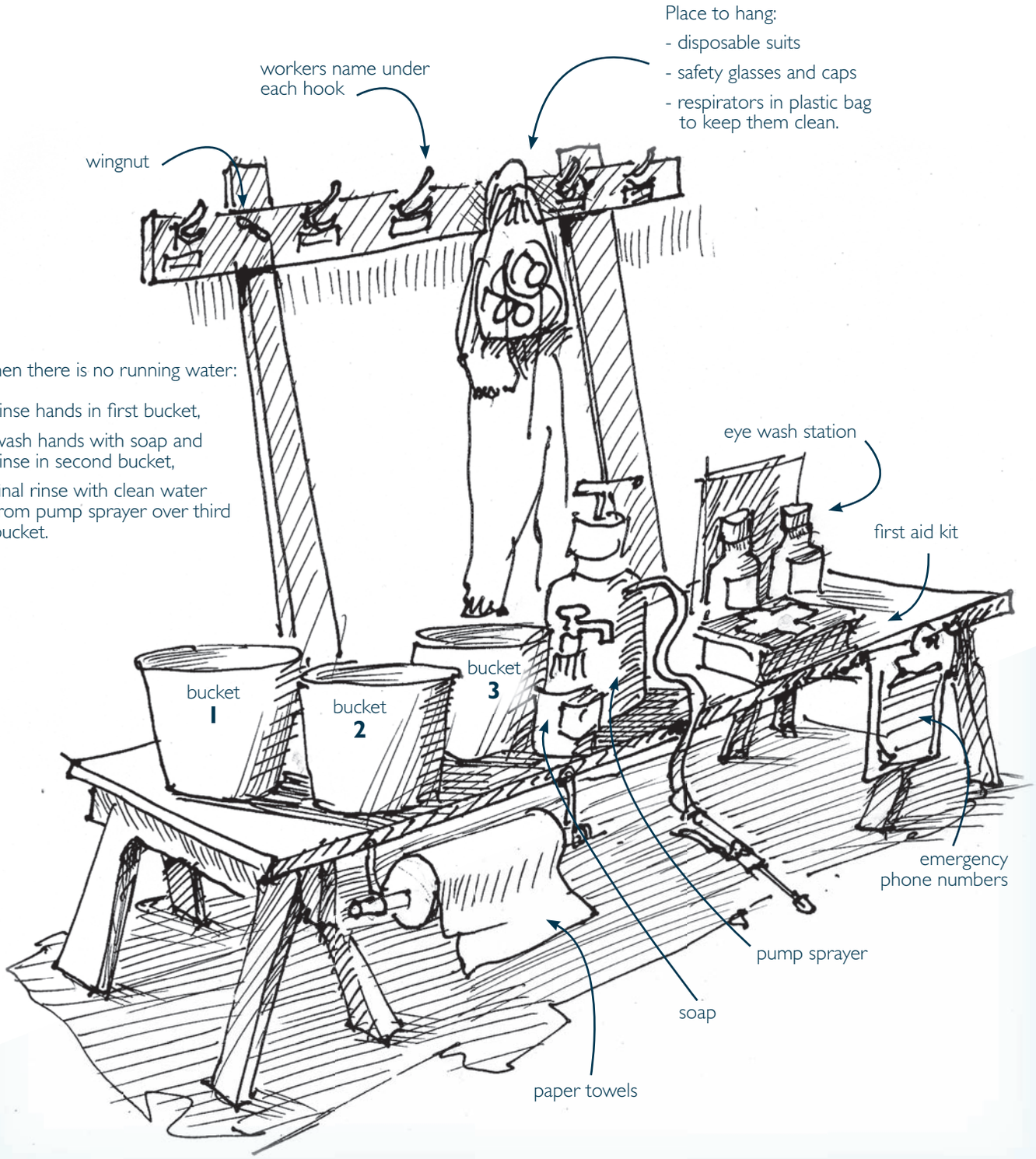
- Drink lots of water, even when you are not thirsty.
- Take breaks and rest in a cool, shady spot.
- Wear lightweight, light-colored clothing made of cotton.
- Do the heaviest work in the coolest time of the day.
- Control the heat at the source through the use of insulating and reflective barriers.
- Reduce the temperature and humidity through air-cooling.
- Avoid alcoholic beverages.

Work Site Areas

Separate areas for:



Cleanup/Health and Safety Station



Containment

Helpful Hint: Always separate the work areas from the clean areas.

1 **Why do I need containment?**
It is important to keep clean areas separate from the work areas to minimize the risk of contamination. Separate the storage or living areas from the work areas by hanging plastic sheeting.

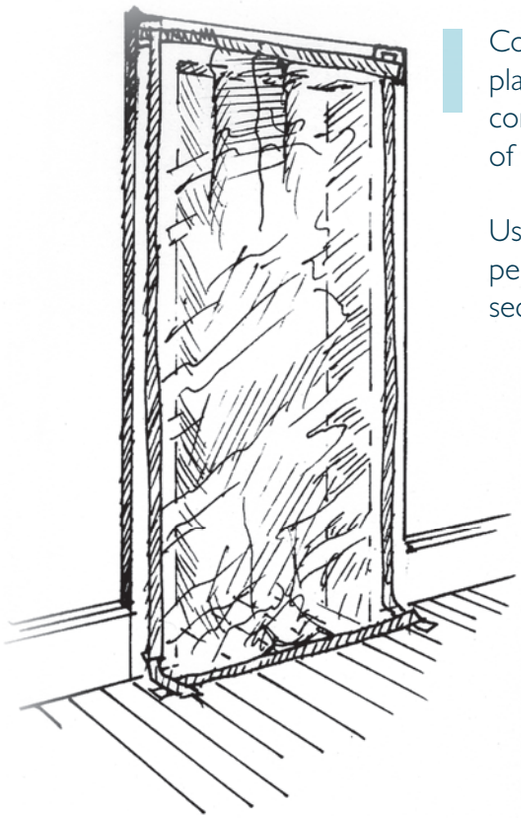
2 **Where should I set up a containment area?**
Set up a containment area anywhere that you need to separate the work areas from the clean areas.

3 **How should I set up a containment area?**
First, set up a plywood pathway throughout the house, especially if there was major damage to the floorboards or if there is a possibility that they are not structurally sound. Cut the plywood into 2' x 8' sheets to build the walkway. Then follow these steps to set up a containment area.

- Cover the door opening with plastic sheeting -- the top two corners should be reinforced with duct tape and stapled. The side perimeter should be sealed with masking tape. The bottom should be duct taped, with the corners stapled to the floor.
- Cut a slit in the plastic sheeting from about 5'' up from the floor. This will allow passage into and out of the room.
- Finally, tape a sheet of plastic as wide as the opening to the top of the door on the clean room side. Let it hang a few inches from the floor. The air current will be blowing from the containment area side pressing it against the cut opening.

Creating a Poly Flap Seal

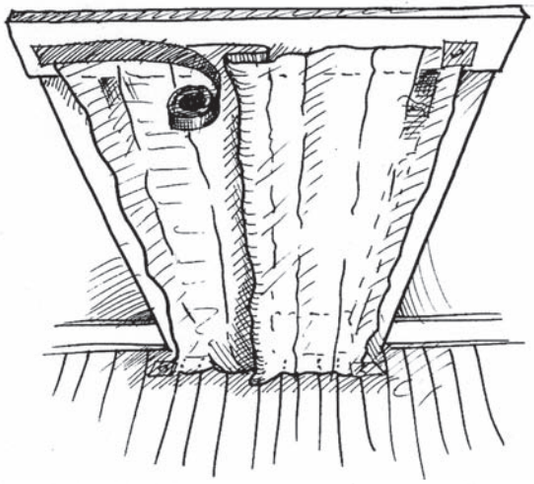
Reinforce all staple points with folded over squares of duct tape.

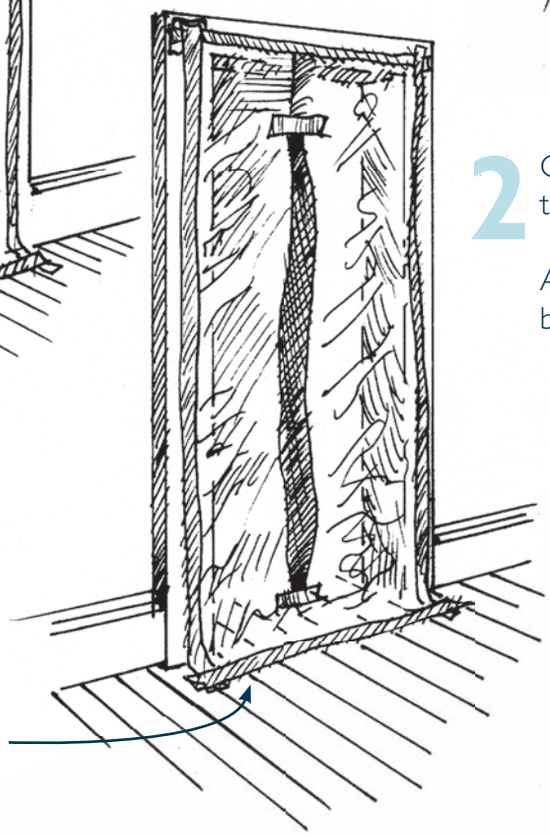


1 Cover door with 6 mil plastic. Staple all four corners. Leave several inches of slack on all sides.

Use masking tape around perimeter once corners are secured.

slack at top of door

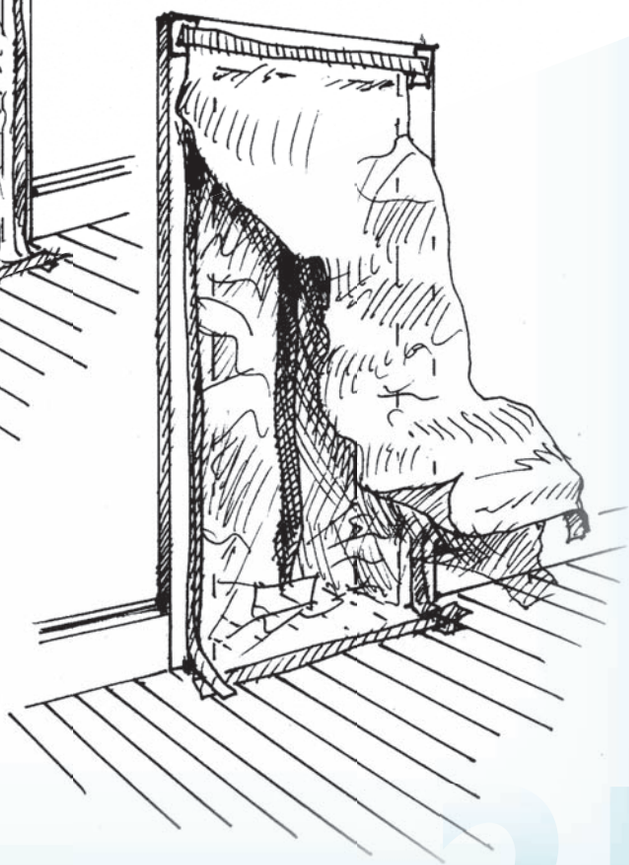




Seal poly to floor with duct tape and staples.

2 Cut slit from approx. 5" from floor to about 5" from door head.

Add duct tape on top and bottom of cut for reinforcement



3 Place second sheet (2 or 3 mil poly) on side of opening that breeze is coming from so breeze closes flap. Tape it to top of door and let it hang just short of floor.

III Personal Protective Equipment (PPE)

Helpful Hint: Wear PPE every time you enter a hurricane-damaged home.

What should I wear to protect myself?
Choose PPE that is appropriate for the job and environment in which it will be used.

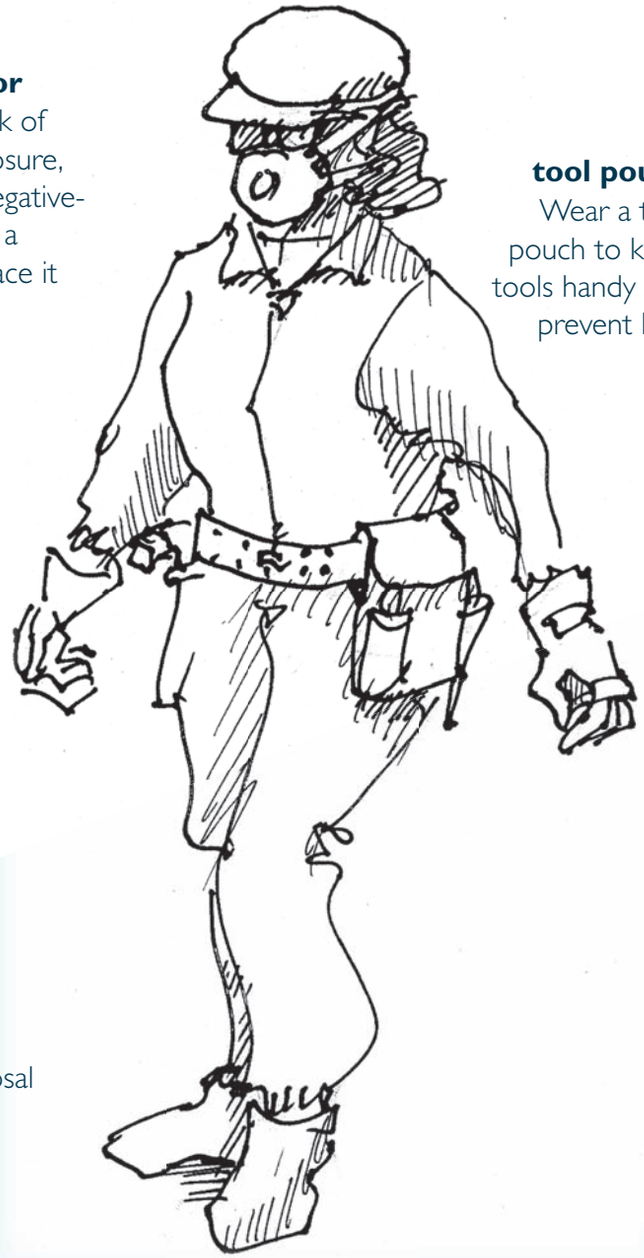
- **Lungs:** For most cleanup work, use a half-face negative-air respirator with HEPA filters. **If you purchase a respirator or use a donated one, thoroughly read the instructions provided.** People with allergies or asthma should not be working in moldy or dusty areas.
- **Eyes:** Wear goggles or safety glasses with side shields, or a full-face shield. Hazards exist that could cause eye or face injuries.
- **Ears:** Wear earplugs or earmuffs in high noise work areas.
- **Feet:** Wear non-skid shoe covers over work boots that have a steel shank, toe, and insole.
- **Head:** Wear a cap with a brim or other protective head cover. Wear a hard hat if there is any danger of falling debris.
- **Hands:** Wear heavy, waterproof, cut-resistant gloves to protect hands from cuts, chemicals, temperature extremes, and abrasions.
- **Body:** Wear breathable, disposable coveralls with elastic wrists and ankles.

Personal Protective Equipment (PPE)

safety glasses & cap
Where there is no risk of dust or fumes, wear glasses or safety glasses and brimmed cap. The cap protects your eyes and hair.

...plus respirator
Where there is risk of dust or mold exposure, wear a half-face negative-air respirator with a HEPA filters. Replace it when it gets dirty.

disposable suit
Use breathable, disposable suits in high dust/mold work. Use suits with elastic ankles and wrists. If you don't wear disposable coveralls, be sure to change out of your work clothes, or at least vacuum them, before going home.



tool pouch
Wear a tool pouch to keep tools handy and prevent loss.

gloves
Wear heavy-duty gloves when doing clean out and demolition. Only wear non-latex rubber gloves for short times when cleaning out wet materials.

shoe covers
Keep shoes clean with non-slip disposal shoe covers.

2 **When should I wear PPE?**

- Wear all of your PPE any time you plan to enter a hurricane-damaged home. When taking breaks, leave the home and remove your PPE in the cleanup area.
- Make sure to wipe and wash off your hands and face before eating, drinking, smoking, or any other activities to limit how much mold, lead dust, and asbestos fiber gets into your body.
- Put your PPE back on before re-entering the home. Inspect your PPE before each use to determine if there are any holes or other damage. If any of these are present, replace your PPE.

3 **What should I avoid doing when wearing/selecting my PPE?**

- Avoid wearing gloves that are too thick or too large for safely handling objects.
- Do not wear tennis shoes or sneakers under the non-skid shoe covers, because they will not prevent cuts, punctures, or crush injuries.
- Do not wear hard hats backward.

Lesson Summary *You should now able to:*

1 **Identify which items to include in a cleanup station.**
The cleanup station will provide a break area for workers to wash up and treat minor injuries.

2 **Set up a containment area.**
Containment must be set up to separate the work areas from the clean areas.

3 **Determine which personal protective equipment you will need.**
Choose PPE that will be appropriate for the job and environment.

Notes:

LESSON 3 Performing the Cleanup

How should I clean out hurricane-damaged homes?

Objectives:

After completing this lesson, you should be able to:

- Identify salvageable items.
- Gut and tear out building materials.

Work Sequence

The work sequence should be performed in phases:

- Clean Out: the removal of all damaged possessions
- Demolition: the removal of all damaged materials
- Disinfecting: treating all remaining building components for mold
- Rebuilding

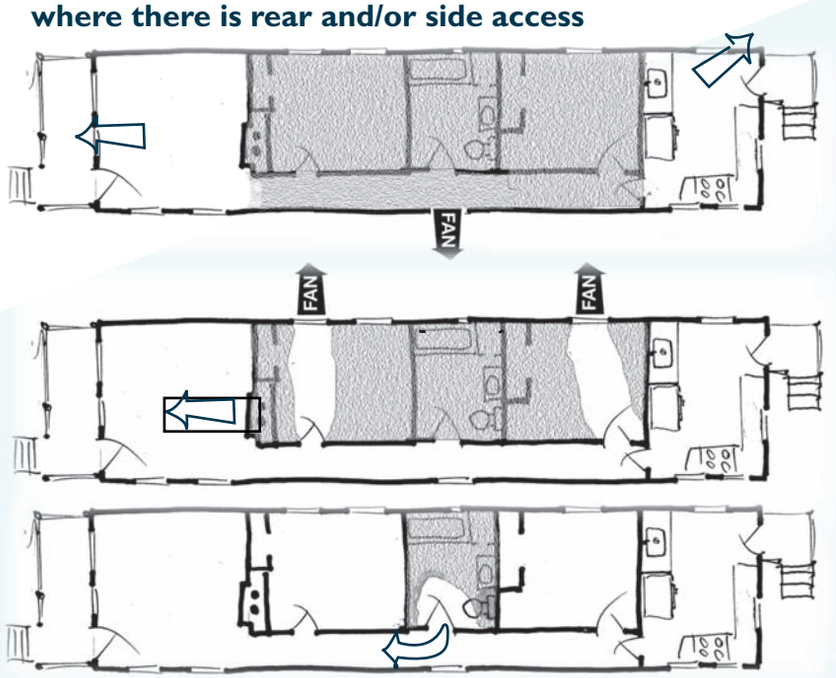
Where should I start cleaning first?
Start cleaning out from a place that is already clean.

where there is no front or side access

- Don't walk on piles of rubbish.

Helpful Hint:
Work from top to bottom.

where there is rear and/or side access



- Start clean out from a place that is already clean.
- Carry materials the shortest possible distance to the outside.
- When possible, use fan to pull air from cleaned areas.

Clean Out

After it is determined that it is safe to enter the storm-damaged dwelling, make sure to air out the building if it has not been open since the storm.

- Ventilate the attic and open the crawl spaces.
- Open all windows and doors for at least half an hour before beginning any type of work.
- Remove all drapes and curtains to allow air and light into the house to help speed up the drying process. If electricity is available, set up a fan and dehumidifier.
- Remove large objects from the building and place smaller objects in heavy-duty trash bags.
- Carry all building materials the shortest possible distance to minimize the risk of cross-contamination.

Furniture

Helpful Hint: Watch out for exposed nails.

1 **What furniture should I remove?**
Upholstered furniture pieces and mattresses that remained wet for more than 48 hours should be thrown away, if they cannot be cleaned thoroughly. They are often difficult to clean and the cleaning cost may be more expensive than the replacement cost.

2 **How should I remove the furniture?**
Always use dollies or wheelbarrows to remove furniture. Some furniture may be weakened by water, particularly those pieces made of pressboard, which may collapse when being moved. If possible, take those apart prior to moving them.

3 **What furniture should I save?**
Valuable furniture may be saved, but it should probably be stripped and reupholstered. Wood or metal furniture can usually be saved.

Appliances and Fixtures

1. **What appliances and fixtures should I remove?**
Any electric appliances that got wet should be removed; these may include refrigerators and stoves.

2. **How should I remove the appliances and fixtures?**
Do not move large appliances on handcarts, because they can easily tip over. Tape or tie refrigerators shut before removing them, to avoid spilling old food, which may contain mold and bacteria. Tie appliances onto a dolly, and move them on their sides to avoid damage to coils.

3. **What appliances and fixtures should I save?**
Save plumbing fixtures such as sinks, toilets, and bath tubs whenever possible.

Carpet

1. **What carpeting should I remove?**
Remove wall-to-wall carpeting that is wet. Dry carpeting can remain on the floor as a "tarp" when you remove building materials from the walls and ceilings. The carpeting will help protect the flooring underneath. Flooded carpet padding should always be discarded and replaced.

2. **How should I remove the carpeting?**
Cut carpet into small, easily-moved pieces before removing it.

3. **What carpeting should I save?**
Area rugs can be hosed off, dried, and then sent to a rug cleaner.

Small Objects

1 **What small objects should I remove?**
Always dispose of cosmetics, toys, books, documents, and any items that absorbed floodwater.

2 **How should I remove the small objects?**
Place all small items in heavy-duty trash bags to minimize the release and spread of mold spores.

3 **What small objects should I save?**
Records and CDs can usually be saved. Any containers, such as pots and buckets that were filled with floodwater, should be removed carefully; they may contain dangerous disease-causing bacteria from the floodwater. Items that were touched by floodwater will have to be disinfected and may be saved.

III Gutting and Tear-Out Procedures

Cabinets, Shelves, Doors, and Trims

Helpful Hint: Avoid contact with sediment, which may contain toxic chemicals.

1 **Should I remove cabinets, shelves, doors, and trims?**
Many damaged homes contain valuable historic materials, such as doors and decorative trims. These materials are usually of higher quality than what you can buy as a replacement and are therefore worth salvaging. If possible, try to save any historic materials that are in good condition and where the mold can be removed. However, it may be cheaper to dispose of building parts that have been damaged by the flood or mold growth.

Kitchen cabinets made of pressboard or other composite boards that got wet cannot be saved. However, cabinets (especially upper cabinets) that are made of plywood or wooden boards may be saved.

Remove doors if they are swollen and heavily water damaged. Doors in older buildings that are made from old growth lumber usually can be saved. These doors should be professionally restored.

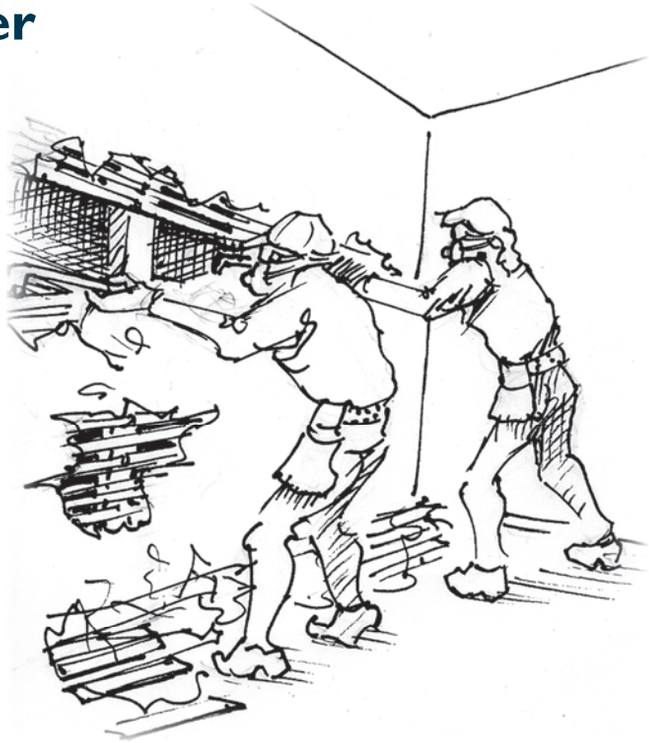
2 **How should I remove cabinets, shelves, doors, and trims?**
Remove and dispose of interior doors. Pull the cabinets and trim from the walls. Remove the trim first, and then remove the drywall. Bend all protruding nails when removing the trim, to prevent future puncture hazards. Tie large boards in a bundle before disposal.

Ceilings

1 **Should I remove drywall or plaster from ceilings?**
If there is no noticeable mold growth on either side of the ceiling, the ceiling may be saved.

2 **How should I remove drywall or plaster from ceilings?**
When tearing down a ceiling, work from a ladder that allows you to have your head above the ceiling and be standing at least two treads from the top of the ladder. This prevents the ceiling from coming down on top of you. Keep your head above the ceiling surface, and push down with a crowbar. Have a second person with you when you do this work.

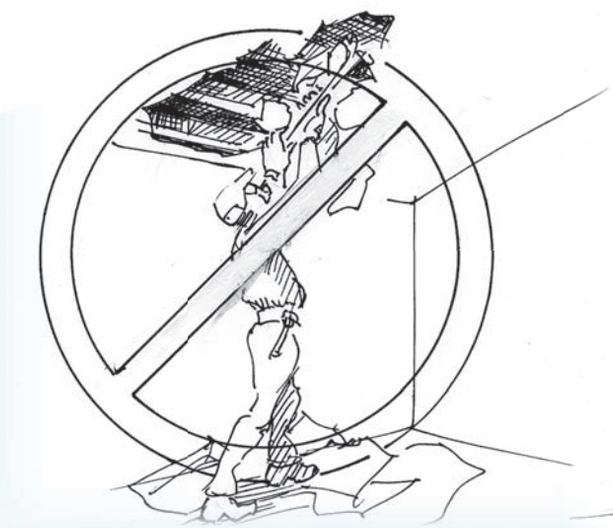
Tearing Down a Plaster or Drywall Ceiling



Try to save plaster walls, because plaster resists mold and roaches. It also lasts much longer than drywall and can be easily maintained.

If plaster walls must be demolished, cut a channel, place hook of crowbar behind lath, and pull. Two or three people doing this together works best. This will put the lath on top so it can be picked up, bundled, and removed separately from the plaster. (Lay it on a looped piece of rope.) Wear heavy gloves to protect your hands from nails.

Never pull ceiling down on yourself



Work with your head close to the ceiling

Work from a ladder so the ceiling can be pushed down. Use a tall enough ladder so you don't need your hips to be above the top of the ladder. Never set ladder on rubbish. Sometimes you can work from the attic standing on a plywood sheet to avoid falling through the ceiling. Use a sledgehammer or other heavy tool to gently push the ceiling down.

Walls

Helpful Hint: Work with a partner when tearing down ceilings and walls.

1 Should I remove drywall or plaster from walls?

Drywall that has been under floodwater must be removed. If flood or mold damage is high, remove all of the drywall up to the ceiling. If there was limited flooding, drywall may be removed up to the four-foot line. However, no mold must be visible above the four-foot line on both the inside and outside of the wall for this option to be safe.

2 How should I remove drywall or plaster from walls?

Make sure that electricity in the wall is turned off at the electrical service panel.

Drywall:

- Cut the drywall with a utility knife at the four-foot mark where the top and bottom pieces of the drywall were taped together when the wall was built.
- Pull out the drywall with the hook of a crowbar. Remove drywall in large pieces to minimize dust. Once you have opened up an inside wall, push out the drywall into the next room.
- Remove all nails and screws from the studs.

Plaster:

- Cut through the plaster and lath between studs with a reciprocating saw.
- Use a pry bar to pull the plaster and lath away from the studs. If there is no saw available, use the pry bar to punch through walls and pull the lath and plaster down.
- Bundle the lath separately and remove it.
- Shovel plaster into large cans for disposal in a dumpster or heavy-duty bags for curbside pick up.

CAUTION: *Painted surfaces may contain lead-based paint.*

Floors

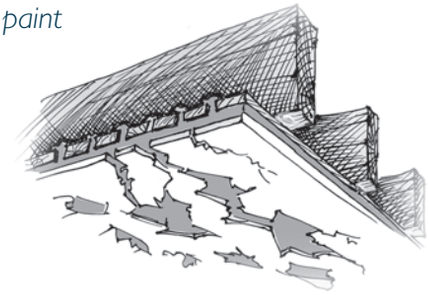
1 **Should I remove tiles, vinyl, linoleum, or tongue-and-groove wood from floors?**
Remove all tiles, vinyl, linoleum, plywood, and hardwood, especially if it was badly water damaged and showed signs of swelling or separating. Tongue-and-groove wood floors can be saved if the underside has dried out.

2 **How should I remove tiles, vinyl, linoleum, or tongue-and-groove wood from floors?**
Carefully remove flooring every few feet to reduce buckling caused by the swelling. If wood boards are tongue-and-groove floors, consult a carpenter or flooring professional. When floor coverings are removed, allow sub-flooring to dry thoroughly before installing new flooring.

CAUTION: *Vinyl tile may contain asbestos.*

Plaster Ceiling and Wall Damage

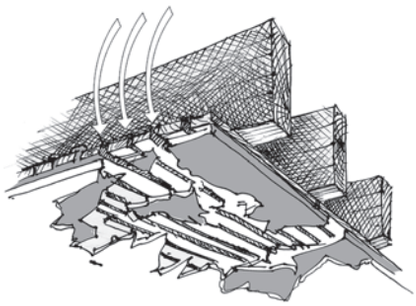
1 Loose paint can be scrubbed off surfaces. Use a wet abrasive sponge to minimize dust. Repaint starting with a high quality primer. If there is minor cracking in the plaster finish-coat, apply an encapsulate. *If you suspect lead-based paint, you need to follow suggested guidelines for removing or repairing surfaces with lead-based paint discussed in an earlier lesson.*



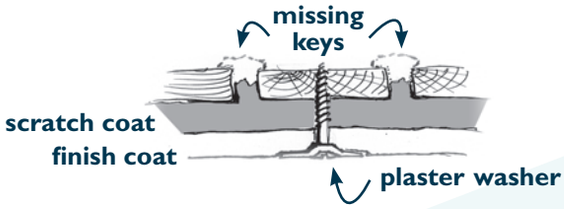
2 Where the finish coat is delaminating from the scratch coat, skim coat the damaged areas then prime and paint.

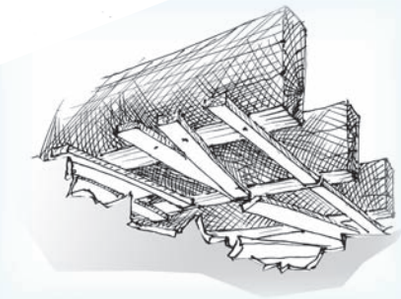
Note: Plaster keys are broken off (Keys are formed where plaster squeezes between lath and is hooked onto back of lath.)

3 Where the plaster keys are broken and plaster is pulling away from the lath, tighten loose plaster back to the lath with plaster washers. Where possible squeeze construction mastic through holes between plaster base-coat and lath. This can be held while drying by wedging a 2X4 between the floor and a square of plywood against the ceiling.



Apply base coat of joint compound to patch. Be sure it squeezes between the lath, then apply two more coats, allowing drying between coats. Sand final coat.





4 Where plaster and lath has broken away from the joist, remove the damaged area and square-up the edges. Install sheets of drywall. Fur out bottom of joist so the drywall is slightly below the plaster finish coat. Then skim-coat the drywall flush with the existing plaster. Use a veneer plaster. (It would be preferable to re-plaster the damaged areas if the skill and funds are available.)

Insulation

1. **Should I remove insulation?**
Remove and discard all wet fibrous insulation.

2. **How should I remove insulation?**
Remove insulation in heavy duty trash bags and dispose of it.

CAUTION: *Insulation may contain asbestos.*

Lesson Summary *You should now able to:*

1. **Identify salvageable items.**
In general, porous items that have been wet for more than 48 hours should be discarded. Non-porous items may be salvageable if cleaned and disinfected.

2. **Gut and tear out building materials.**
Building materials that have been damaged by flood water and mold should be disposed of properly.

Notes:

LESSON 4 Rebuilding

How should I rebuild hurricane-damaged homes?

Objectives:

After completing this lesson, you should be able to:

- Know how to prepare, disinfect, and treat building surfaces.
- Identify methods to properly restore possessions.
- Conduct a final assessment.

Surface Cleaning and Treatment

How should I prepare the surfaces?

- Remove all remaining nails and/or screws from the studs or ceiling joists.
- Brush ceiling, studs, and exterior walls with a bristle broom or hand brush to remove all invisible insulation and pieces of drywall and loosen mold spores.
- Work from top to bottom.
- After wood framing is thoroughly brushed or scraped, carefully vacuum all surfaces, including outlet boxes and open ducts.
- Use a corner tool to access tight spaces.
- Clean all surfaces with a vacuum that has a HEPA filter.
- Let dust settle.
- Re-clean any remaining visible areas of mold growth following this method. In homes where studs are already fairly dry, only dry cleaning with a HEPA vacuum step is needed, and wet cleaning may be skipped.

Wet Cleaning (Optional): Damp wipe with a nonphosphate detergent and wash all remaining wood surfaces such as studs, backs of exterior walls, and floors where visible mold growth could not be removed through dry cleaning. Start at the ceiling, wipe with sponge mops and hand sponges until all visible dirt and stains are removed. During damp wiping, use the least amount of water possible to avoid soaking the building materials. If wood does become very wet, let it dry completely before taking the next steps. Wet surfaces that do not get fully dry may have new mold growth.

Helpful Hint: Clearly label bottles of bleach and other cleaning solutions.

2 How should I disinfect the surfaces?

Use a disinfectant to kill any remaining mold or bacteria that remained on hard surfaces.

- Damp wipe all surfaces, including bath tubs, bathroom and kitchen fixtures, and vinyl/tile floors, with a solution of liquid chlorine bleach and water mixed with nonphosphate detergent.
- Use a ratio of one cup of bleach to one gallon of water.

CAUTION: *Never mix bleach and ammonia.*

- Throw away any unused solution at the end of the workday because it loses its effectiveness overnight.
- Wear appropriate personal protective equipment (minimum PPE of gloves and goggles/safety glasses).

Liquid chlorine bleach is recommended for disinfection on: refrigerators, work surfaces, garbage disposals, freezers, sinks, appliances, plastic laminate, stoves, stovetops, countertops, (ceramic) tile floors or countertops, vinyl, linoleum, solid surface countertops, glass, garbage cans, trash cans, trash compactors, latex enamel painted woodwork, and faucets. All brushes and sponges that were used for cleaning should be discarded at the end of the job.

3 How should I treat the surfaces?

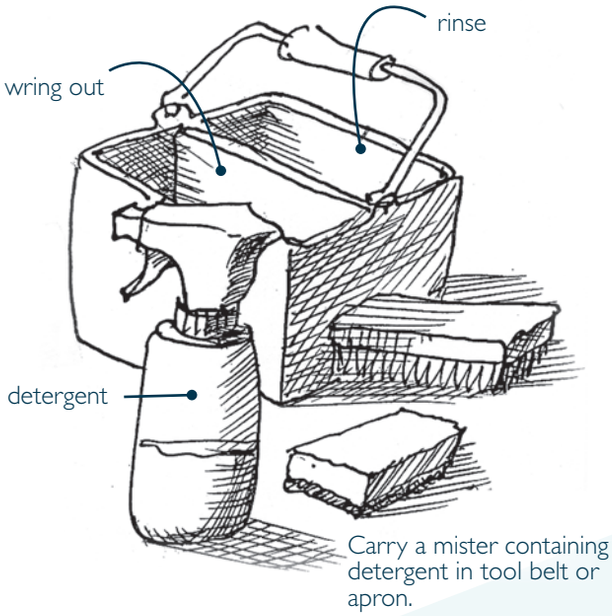
Once the surface dries it is ready for the application of a borate solution.

- Wash or mist the open wall cavities with a borate solution prepared according to the manufacturer's directions for wood fungi. Although these products are more expensive than household bleach, borate solutions do not corrode or whiten building materials and are safer to use around metals and valuable wood products. Borate solutions soak into wood more effectively.
- For best coverage, apply borate solutions with a pump up tank sprayer. However, a paintbrush, paint roller, or trigger spray bottle may also be used. This treatment has the added advantage of discouraging termite infestations.
- Before beginning reconstruction, paint dried wooden studs and beams with a low toxicity fungicidal protective coating as a final treatment to prevent mold growth.

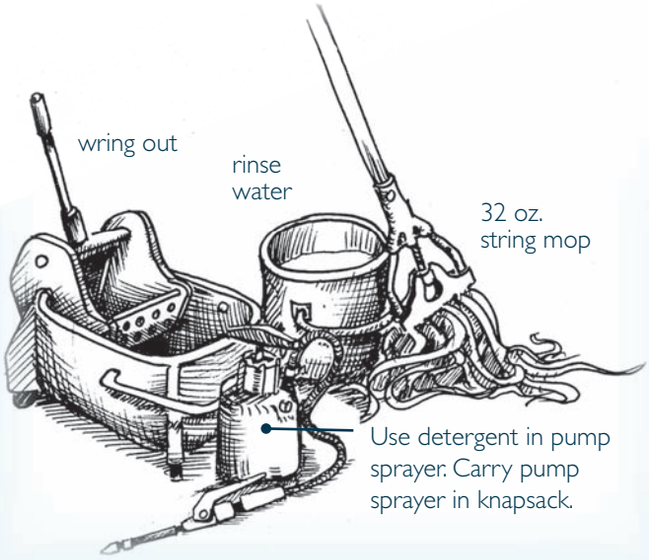
Vacuuming Surfaces

- During cleanup, wear N100 respirator, safety glasses, and cap.
- Wear water proof gloves in wet areas.

1 Using a stiff scrub brush, scrub all finished surfaces. Place non-phosphate detergent in a mist or pump sprayer. Change rinse water frequently. Wring out rag or mop in separate bucket or second side of a double bucket. Where there is heavy build-up of mold on structural surfaces, scrape first.



2 Once dry, vacuum all surfaces including electric outlet boxes and open ducts using a HEPA or high efficiency vacuum cleaner. A back-pack vacuum is ideal for working off ladders, cleaning floors and crevices, and doing integrated pest management (IPM) work.

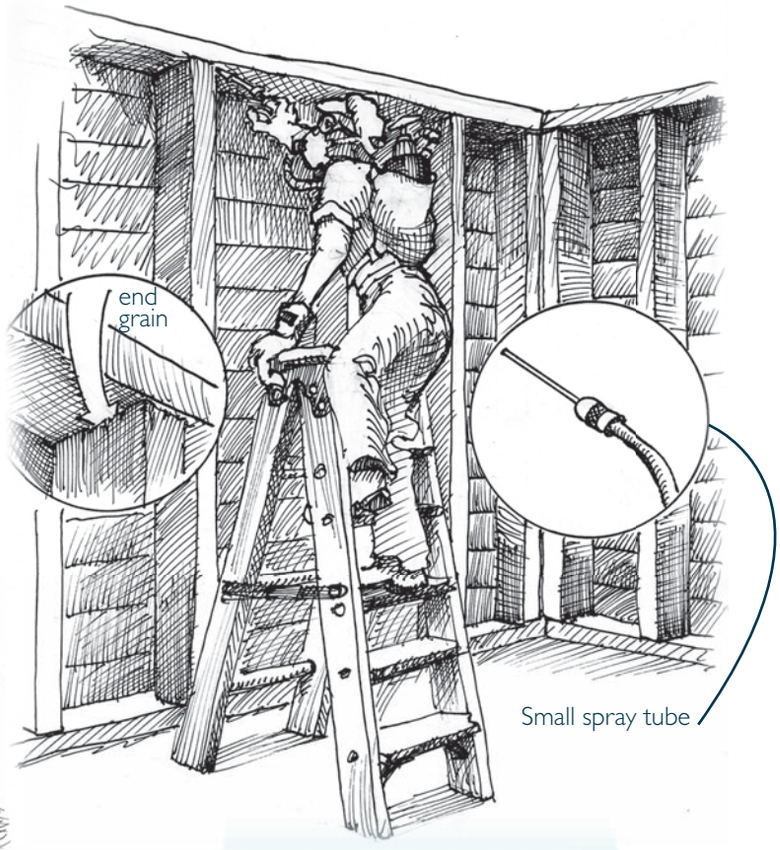


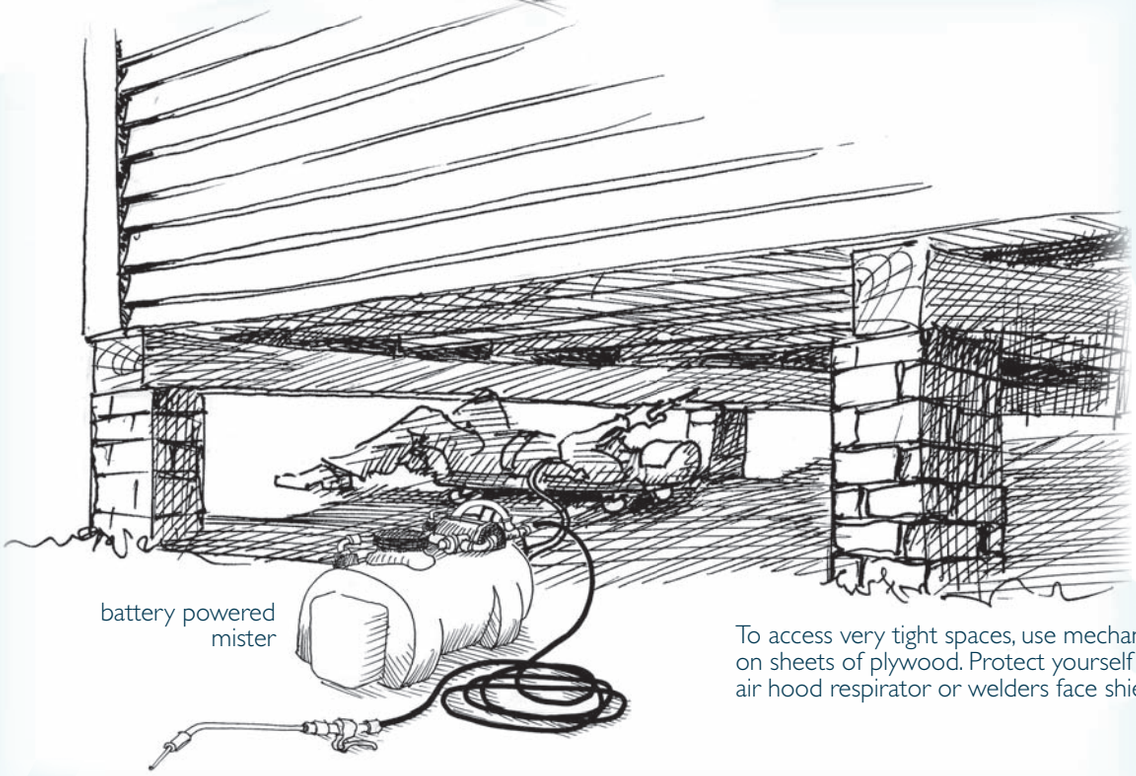
3 Mop the floors, changing rinse water frequently. Always air-dry mops and rags in the sun.

Borate Treatment

1 Mix borate solution in pump or power sprayer reservoir.

2 Soak wood, paying particular attention to the end-grain. Where necessary, pry studs away from plates, or joists from ribbon board (the boards on the end of floor joists around the building's perimeter). Then squeeze tube into opening to soak end-grain. Allow to dry then apply second coat.





To access very tight spaces, use mechanics' creeper on sheets of plywood. Protect yourself with positive air hood respirator or welders face shield.

Rebuilding

Make sure that the home is allowed to completely dry before beginning restoration. Depending on how dry the home is before cleanup work begins, natural ventilation may produce a dry home in a couple of weeks or a few months. If electricity is available, use fans, dehumidifiers, and window air conditioners to help speed drying.

As much as possible, rebuild with flood and wind resistant methods. Use mold resistant materials.

Flood and Wind Resistant Design

Helpful Hint: Consider installing an attic hatch for escape in case of future floods.

1 **How should I safeguard my family against future floods?**
Maintain a safety station in the attic, second floor, or an easily accessible place above the flood line. Include items such as a first aid kit, bottled water, a flashlight with extra batteries, waterproof gloves and wading boots, a respirator, safety glasses, and a battery operated generator. In the kitchen, store items that will not be damaged by floodwaters on the bottom shelves.

2 **How should I safeguard my home against future hurricane-force winds?**
Seek the advice of an engineer, and follow local building codes.

III Restoring Possessions

Furniture

How should I restore furniture?

- Sponge off salvageable (see Lesson 3 for salvageable and unsalvageable items) furniture with clean water using a soft sponge or cotton rag.
- Blot off excess water with clean cloths or paper towels.
- Clean with a wet cleaning solution.
- Allow furniture to slowly air dry.

Appliances and Fixtures

How should I restore appliances and fixtures?

- Unplug appliances, and leave them open to dry.
- Have them inspected by a competent appliance repairman before re-using.
- Sponge off salvageable fixtures with clean water using a soft sponge or cotton rag.
- Blot off excess water with clean cloths or paper towels.
- Clean with a wet cleaning solution.
- Allow fixtures to dry.

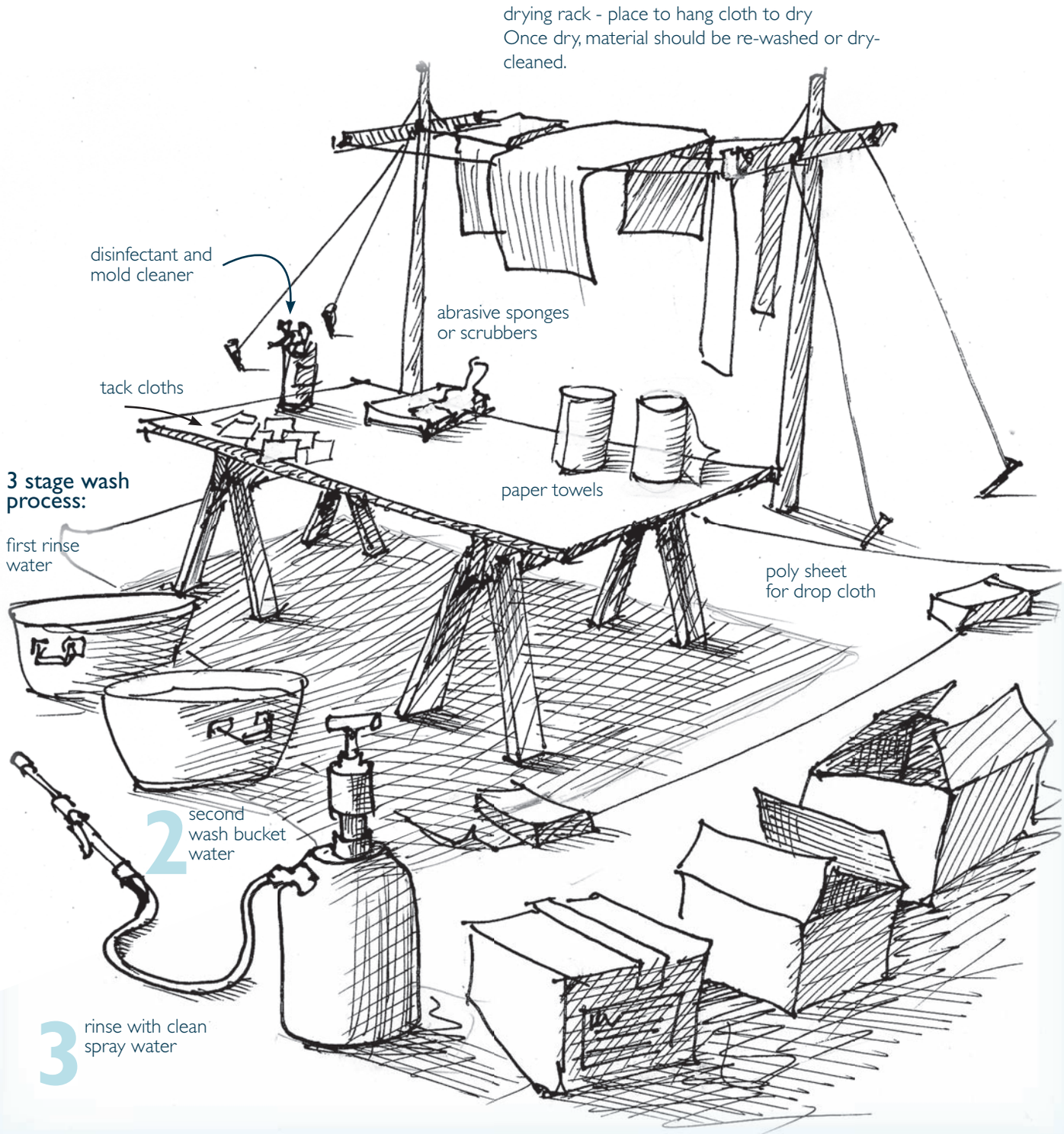
Small Objects

How should I restore small objects?

- Wash or wipe items in a disinfecting solution and rinse after five minutes. Wipe them dry, and make sure that they have dried completely before moving them to storage.
- Valuable artwork can be HEPA vacuumed to remove surface mold, then wiped with a damp paper towel and air-dried.
- Clothing should generally be thrown away after flooding. However, if clothing and other cloth materials will be saved, wash them in a washing machine. Add two tablespoons of liquid chlorine bleach per washer load. Dry cleaning may also be used, especially for special fabrics.

Possession Cleanup Station

Where possible, locate this operation in a garage or under a tent.



Dry possessions to be saved. Then place in boxes which include address and contact information of owner.

IV Quality Control

Check the quality of your work during the job and at the end of the job. Ask yourself the following questions:

- Was the problem corrected?
- Were proper work practices used?
- Was cleanup done thoroughly?
- Perform clearance if lead-based paint was disturbed. Refer to *www.hud.gov/offices/lead*

It is important to assess the quality of your work because:

- Failing to correct conditions causing damage or deterioration may result in repairs that do not last.
- Failure to follow proper work practices may spread contaminants beyond the work areas into the living areas.
- Poor cleanup may leave behind hazardous conditions.

Lesson Summary *You should now able to:*

1. **Prepare, disinfect, and treat building surfaces.**

2. **Explain methods to properly restore possessions.**
After wet cleaning, always allow items to air dry thoroughly before putting them away.

3. **Conduct a final assessment.**
Always check the quality of your work, especially after the job is completed to make sure that the problems were fixed correctly.

Notes:

APPENDIX I

Supplies and Materials

Cleanup station supplies

- ☑ A first aid kit
- ☑ A fire extinguisher
- ☑ Several cleanup buckets
- ☑ Soap
- ☑ An eye wash station
- ☑ Bottled water
- ☑ A list of emergency phone numbers
- ☑ Paper towels
- ☑ Pump sprayer

Tools

- ☑ Scrapers
- ☐ Abrasive sponges and soft sponges
- ☐ Stiff brush
- ☑ Buckets
- ☑ Mop
- ☐ Spray bottles
- ☐ Broom and dust pan
- ☑ HEPA vacuum cleaner
- ☐ Wet/Dry vacuum
- ☐ Fans
- ☑ Plastic sheeting
- ☐ Carpet cutter
- ☐ Wheelbarrow, handcart, and dolly
- ☐ Tool pouch or belt
- ☐ End cut pliers
- ☐ Positive air hood
- ☐ Hand sanders and planers
- ☑ Crowbar
- ☑ Hammer and assorted nails
- ☐ Current tester (for electrical work)
- ☐ Pump sprayer
- ☐ Generator
- ☐ Dehumidifiers
- ☐ A-frame ladder
- ☐ Painting supplies
- ☐ Cooler for food and cool drinks
- ☐ Lamps
- ☐ Saw

Personal Protective Equipment

- ☑ **Lungs:** N100 respirator
- ☑ **Eyes:** Goggles or safety glasses
- ☐ **Ears:** Earplugs or earmuffs
- ☑ **Feet:** Non-skid shoe covers, work boots
- ☑ **Head:** Cap with brim or other protective head cover
- ☑ **Hands:** Heavy, waterproof, cut-resistant gloves
- ☐ **Body:** Breathable disposable coveralls with elastic wrists and ankles

Supplies

- ☐ Dust test kit
- ☐ Paint encapsulant
- ☐ Vapor barrier
- ☐ Epoxy system
- ☐ Weather-stripping
- ☐ Plaster wall repair
- ☐ Door mat
- ☐ Water resistant dry wall
- ☐ Borate treatment
- ☑ Heavy duty trash bags
- ☐ Duct tape
- ☐ Construction mastic
- ☐ Detergent
- ☐ Disinfectant
- ☐ Chlorine bleach
- ☐ Joint compound
- ☐ Paint primer
- ☐ 2 x 4 pieces of lumber
- ☐ Veneer plaster
- ☐ Plywood
- ☐ Rope

☑ ***minimum recommendations***

APPENDIX 2

Laws and Regulations

Employers' Responsibilities

What are the employers' responsibilities?
The Occupational Safety and Health Act (OSHA) requires employers to provide a safe and healthy workplace that is free of recognized hazards and to follow OSHA standards. Employers' responsibilities also include providing training, medical examinations, and recordkeeping for exposure to certain substances such as lead and asbestos. The construction industry must follow OSHA standard 29 CFR 1926. More information on OSHA regulations can be found at *http://www.osha.gov*.

Workers' Responsibilities

What are workers' responsibilities?

- Follow the employers' safety and health rules and wear or use all required gear and equipment.
- Follow safe work practices for your job, as directed by your employer.
- Report hazardous conditions.
- Report hazardous conditions to OSHA, if employers do not fix them.

Louisiana State Laws and Regulations

Lead-Based Paint

1 **What are the contractors' responsibilities?**
Contractors are required to be licensed and certified by the state for lead-based paint abatement. They are also required to follow OSHA standard 29 CFR 1926.62.

2 **What are the homeowners' responsibilities?**
Homeowners should follow safety measures to reduce lead-based paint hazards in the EPA brochure "Reducing Lead Hazards When Remodeling Your Home." This brochure is available online at *http://www.epa.gov/lead*.

Asbestos

1 **What are the contractors' responsibilities?**
Contractors performing asbestos abatement in Louisiana must be licensed by the Louisiana State Licensing Board for Contractors. Once licensed, all abatement workers and supervisors are required to become accredited by Louisiana Department of Environmental Quality (LDEQ). Regulations regarding demolition and renovation activities can be found at *http://www.deq.state.la.us*.

2 **What are the homeowners' responsibilities?**
The LDEQ does not regulate asbestos in the home, however, if homeowners decide to remove asbestos containing material themselves, LDEQ recommends using safe work practices such as containment and wetting materials prior to removal. Homeowners may dispose of the materials in a permitted Solid Waste Landfill that is allowed to accept asbestos containing materials.

III New Orleans City Permits and Local Regulations

Building Permits

1 **What are building permits?**
Parishes and cities control construction standards by requiring that each work site has the correct permits. There are many types of permits. Different repairs and modifications require different permits.

2 **Why do I need to worry about building permits?**
If you are discovered doing work on your home without a permit, the city may issue a citation, fine you, or make you stop construction on your home. In addition, many insurance companies will not insure a home under construction that does not have all the necessary permits. Permits are a way for the city to protect homeowners from dishonest contractors. Permits are also a way of ensuring that all construction meets the required building codes.

3 **Where do I get building permits?**
The City of New Orleans Department of Safety and Permits can be reached by phone at (504) 658-7130 or via the internet at *http://www.cityofno.com*.

They have simplified some of the permit requirements to help you rebuild while still keeping you safe from fraudulent construction practices. This office is divided into three different divisions.

- **Building Inspection Division** – Issues permits for all new construction, renovations, additions, and special events (commercial and residential).
- **Electrical Inspection Division** – Issues permits for all electrical work, new or repairs, and for buildings vacant for more than six months.
- **Mechanical Inspection Division** – Issues permits for all mechanical work, new or repairs, and for buildings vacant for more than six months.

Building Codes

1 **What are building codes?**
Building codes are the minimum standards that your home has to meet when construction is completed for the Safety and Permits Department to declare that the home is habitable. As of January 7, 2007, the state of Louisiana has adopted a new Uniform Construction Code. Previously, this code applied to commercial and apartment buildings, but now it will apply to single-family homes. These codes are designed to keep you and your family safe.

2 **Why do I need building codes?**
Part of the new Uniform Construction Code requires that one and two-family homes withstand winds as strong as 130-150 miles per hour. The Uniform Construction Code and higher house elevations apply to all new construction as well as to repairs that will cost more than 50% of the home's pre-storm value. In addition, FEMA regulations may require that you raise the elevation of your house to protect it from floods.

3 **Where can I get more information on building codes?**
More information on the Uniform Construction Code can be found at the website for the Louisiana State Fire Marshal: *http://www.dps.state.la.us/sfm/*

More information about FEMA regulations can be found at: *http://www.cityofno.com/portal.aspx?portal=1&tabid=57*

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