

Hurricane Response Orientation

Safety Awareness for Responders to Hurricanes:

Protecting Yourself While Helping Others



Preface

Hurricane cleanup workers can face potential hazards from oil and chemical spills and leaks, debris, unstable work surfaces, and electrical lines. In addition, the equipment used to do the cleanup work may also pose hazards, particularly to those not trained to properly use it. This booklet was developed by the National Institute of Environmental Health Sciences, as a health and safety resource for “skilled support personnel” who will participate in hurricane response and cleanup activities. This tool will help workers understand at an awareness level how to identify and control hazards pertaining to the response and cleanup activities associated with a hurricane. Trainers may use this booklet and its companion training tool to aid in the development of a hurricane cleanup awareness level course or other awareness level materials (fact sheets, table-top activities, etc.).

Additional information on cleaning up from hurricanes and floods may be found at <https://tools.niehs.nih.gov/wetp/index.cfm?id=2472>.

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Overview

- Introduction
- Hazards
- Other Protective Measures
- Summary





Training Objectives

- Identify the hazards in the field
- Explain how to protect yourself from these hazards
- Increase safety and health awareness





Introduction





Workers' Rights

What are employers' responsibilities?

- The Occupational Safety and Health Act requires employers to provide a safe and healthful workplace free of recognized hazards and to follow OSHA standards. Employers' responsibilities also include providing training, medical examinations and recordkeeping.
- For more information about OSHA, go to <http://www.osha.gov> or call 1-800-321-OSHA (6742)



Workers' Rights (*continued*)

What are workers' responsibilities?

- Follow the employer's 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 to a supervisor.
- Report hazardous conditions to OSHA, if employers do not fix them

Advanced/Additional Training Required

This training tool, and/or its companion booklet, does not replace the additional duty specific training or PPE specific training requirements.

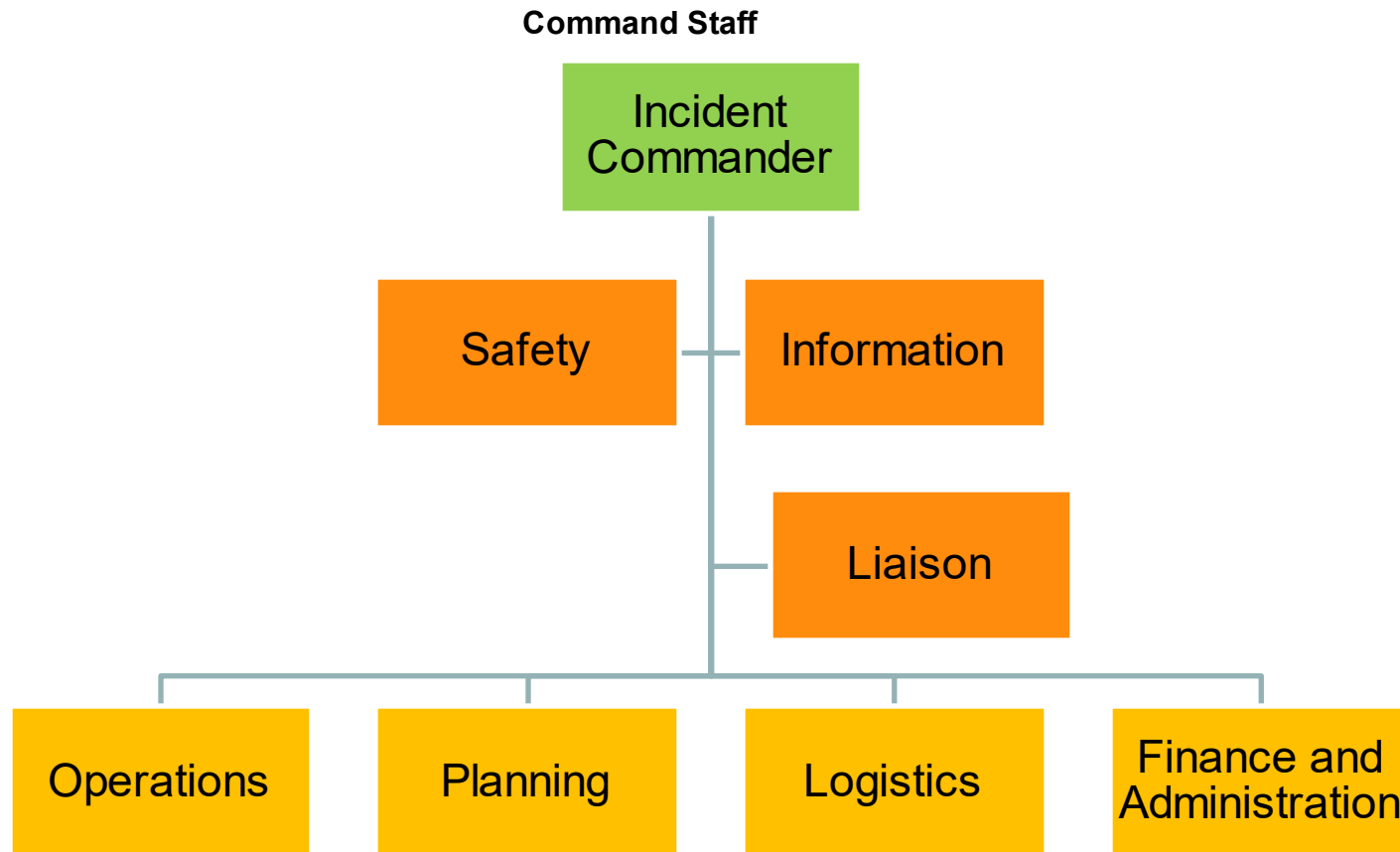
- Regardless of work scope, many topics covered in this awareness booklet/ training tool have corresponding OSHA standards – such standards must be met in order to safely and legally perform associated job duties.
- Cleanup workers should always keep in mind that when in doubt about the safety of an activity, stop what you are doing and ask questions. Be sure you are safe before continuing.
- Contact the National Clearinghouse for Worker Safety and Health Training (202-331-7733) and review the website <https://tools.niehs.nih.gov/wetp/index.cfm> for additional information on hurricane and flood response and cleanup. You may also contact us regarding training for hurricane response and cleanup activities.



Incident Command

- Incident Command provides a structure to promote effective coordination among responders.
- Allows for an integrated organizational structure not hindered by jurisdictional boundaries.
- Has 5 organizational functions to allow for a manageable span of control:
 - Command
 - Operations
 - Planning
 - Logistics
 - Finance and Administration
- Safety is part of the Command function.

Incident Command System Structure





Emergency in the Field

- Notify your supervisor or the incident commander about all injuries sustained at your site.
- For minor injuries:
 - Apply buddycare/first aid
 - Seek a first aid station or clinic
- For serious injuries:
 - Go to local hospital
 - Call 911 (Know your exact location)



Protect Yourself

- Be careful walking over and handling debris that is covered with water due to increased risk of slips, trips and falls.
- Remain current with tetanus vaccination.
- If you will be performing direct patient care or otherwise expected to have contact with bodily fluids, get the Hepatitis B vaccine series.
- Avoid contact with stagnant water.
 - Wash and sanitize immediately if exposed
- Consider steel toe/shank footwear if available.
- Use durable gloves when handling debris.
- Use hearing protection for noisy environments.
- Know your medicines, allergies, and blood type.

If in doubt, contact your supervisor!



Injuries May Result From

- Vehicle accidents
- Struck by
- Falls
- Contusions
- Lacerations



Physical Environment

The land:

- Flat, coastal, some areas at or below sea level at some areas
- Urban areas

The Climate (October-March):

- Low Temperatures (below freezing)
- Potential for additional storms (rain or snow)



Hazard: Falls



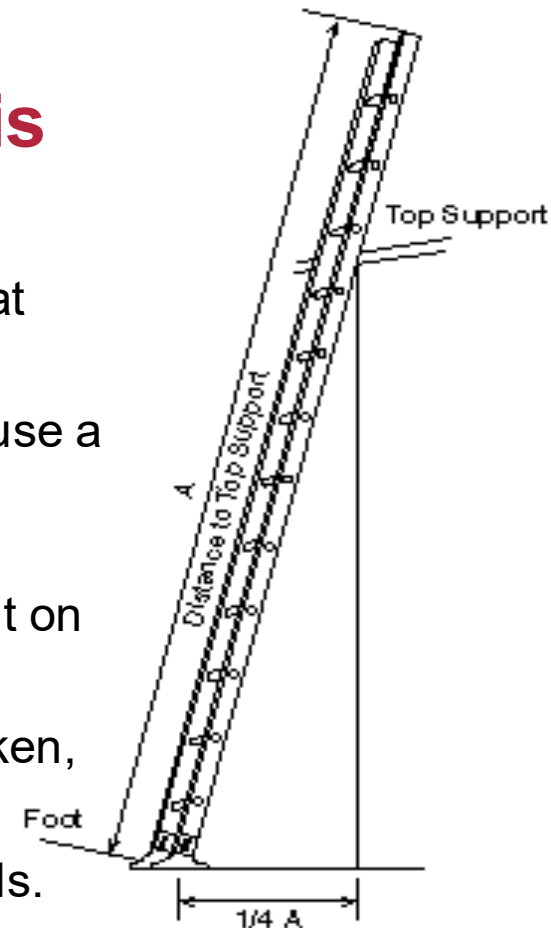
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Hazard: Ladders

- **Ladders can create a falling hazard. Make sure your ladder is secure:**

- Position portable ladders so the side rails extend at least 3 feet above the landing.
- Secure side rails at the top to a rigid support and use a grab device when 3 foot extension is not possible.
- Do not apply more weight on the ladder than it is designed to support and make sure that the weight on the ladder will not cause it to slip off its support.
- Before each use, inspect ladders for cracked, broken, or defective parts.
- Use only ladders that comply with OSHA standards.





The Blue Tarps



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Aerial Lifts



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QA Towers



No Cone or Barrier
between traffic and QA Tower



A proper zone buffer between
traffic and QA Tower



Hazard: Driving





Traffic Issues



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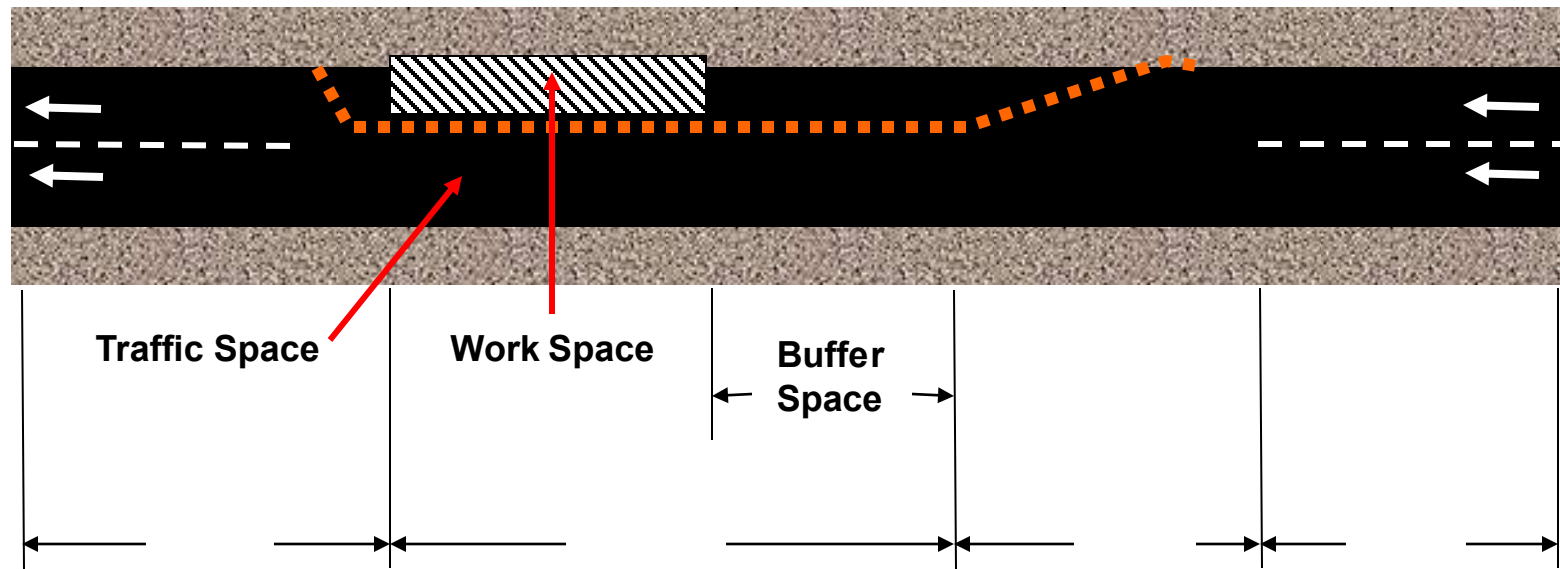
Work Zone Safety



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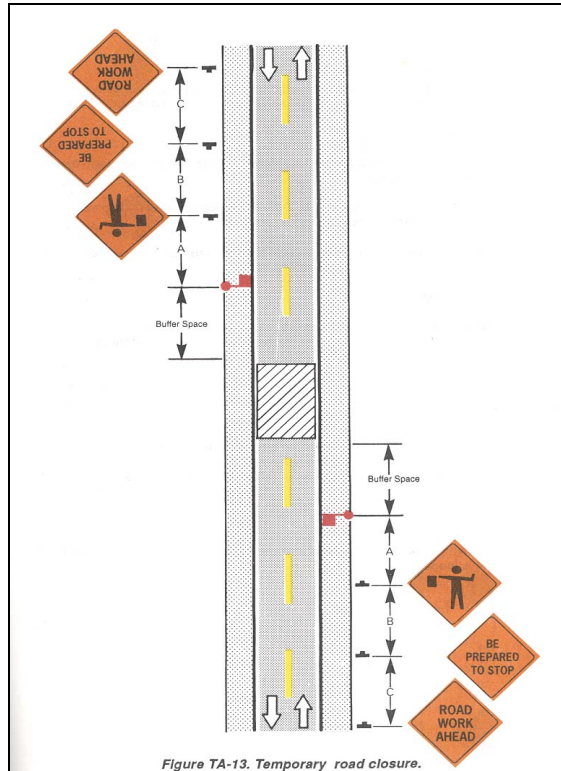


Component Parts of a Temporary Traffic Control Zone





Minimum Signs Recommended in the Manual on Uniform Traffic Control Devices (MUTCD)





Debris Truck Hazards



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Hazard: Electrical, Overhead Power Lines, Downed Electrical Wires, Cables

Jobs Affected

- Debris removal
- Tree pruning

Hazard Control

- Use appropriately grounded low-voltage equipment
- Stay clear of downed electrical lines
- Do not work within 10 feet of energized power lines if you are not a qualified worker
- Only qualified employees may guard or insulate the lines
- Use ground fault circuit interrupters (GFCI).





Exposed Underground Power Lines





Hazard: Operating a Chain Saw



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Operating a Chain Saw

- Wear the appropriate protective equipment
- Always cut at waist level or below
- Avoid contact with power lines
- Bystanders or coworkers should remain at least:
 - 2 tree lengths (at least 150 feet) away from anyone felling a tree.
 - 30 feet from anyone operating a chain saw to remove limbs or cut a fallen tree.





Hazard: Eye Injuries

- Use safety glasses with side shields as a minimum
 - An eye wear retainer strap is suggested
- Consider safety goggles for protection from fine dust particles or for use over regular prescription eye glasses
- Any worker using a welding torch for cutting must have special eye wear to protect against welding flash
 - Welding flash causes severe burns to the eyes and surrounding tissue
- Use only protective eyewear that has an ANSI Z87 mark on the lenses or frames





Hazard: Flying Debris/ Material Handling

- Wear personal protective equipment, including hard hats, safety shoes, eye glasses, and work gloves
- Do not walk under or through areas where cranes and other heavy equipment are being used to lift objects
- Make sure that you have an up-to-date tetanus immunization





Hazard: Debris Piles/ Unstable Work Surfaces

- Don't walk on surfaces you aren't sure are stable
- Use other ways to get to work surfaces, such as bucket trucks
- Erect scaffolding on stable surfaces and anchor it to stable structures
- Wear protective equipment provided, including safety shoes with slip resistant soles
- Use fall protection with lifelines tied off to suitable anchorage points, including bucket trucks, whenever possible

Hazard: Handling a Variety of Sharp, Jagged Materials

- Wear personal protective equipment, including hard hats, safety shoes, eye glasses, and work gloves.
- Immediately clean out all open wounds and cuts with soap and clean water.
- Apply an antibiotic ointment to discourage infection. Contact a doctor to find out whether more treatment is needed (such as a tetanus shot). If a wound gets red, swells, or oozes, seek immediate medical attention.
- Make sure that you have an up-to-date tetanus shot (within the past 10 years).



Hazard: Confined Space

What is a Confined Space?

- Limited access
- Not designed for normal occupancy
- Large enough for bodily entry
- Example: sewers/storm drains

***Your Safety Officer
Must Approve Confined
Space Entry!!!!***



HAZARDS

- Oxygen deficiency
- Entrapment
- Engulfment
- Hazardous atmosphere



Structural Integrity



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Hazard: Heavy Equipment

- Operate equipment correctly and safely.
- Be alert to the activities around you
- Do not exceed the load capacity of cranes and other lifting equipment
- Do not walk under or through areas where cranes and other heavy equipment are lifting objects
- Do not climb onto or ride loads being lifted or moved
- Use outriggers when operating equipment on unstable ground
- Do not ride in or on buckets, forks or blades of heavy equipment





Heavy Equipment

- Forklifts
- Bobcats
- Loaders
- Backhoes
- ATVs





Chippers-Grinders

- Loud noise
 - Use hearing protection
- Flying debris
 - Stay back 300 feet
- Moving parts
 - Do not reach into a machine
 - Do not use machine unless trained and authorized





Health Hazards



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Hazard: Heat Related Illness

Heat Stress	Heat Exhaustion	Heat Stroke
Headache Thirst Profuse sweating Muscle aches	Headache Dizziness Confusion Nausea Sweating-pale, clammy skin Cramps, legs & abdomen Rapid, weakening pulse & breathing	Headache Dizziness Restlessness Confusion Hot, flushed dry skin Body temp above 104° F Unresponsive/disoriented



Hydration is Critical!!

- Drink plenty of fluids
- Drink when you're thirsty. Drink sports drinks, instead of water, if possible.



Hazard: Cold Stress

- When the body is unable to warm itself, serious cold related illnesses and injuries may occur, and permanent tissue damage and death may result.
- **Hypothermia** can occur when ***land temperatures*** are above freezing or ***water temperatures*** are below 98.6° F/ 37° C.
- Cold related illnesses can slowly overcome a person who has been chilled by low temperatures, brisk winds, or wet clothing.



Hazard: Cold Stress (*continued*)

Workers Are at Increased Risk When...

- They have predisposing health conditions such as cardiovascular disease, diabetes, and hypertension.
- They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you while working in cold environments).
- They are in poor physical condition, have a poor diet, or are older.



Hazard: Cold Stress (*continued*)

Frost Bite

What Happens to the Body: Freezing in deep layers of skin and tissue; pale, waxy-white skin color; skin becomes hard and numb; usually affects the fingers, hands, toes, feet, ears, and nose.

What Should Be Done: (land temperatures) Move the person to a warm dry area. Don't leave the person alone.

- Remove any wet or tight clothing that may cut off blood flow to the affected area.
- **DO NOT** rub the affected area, because rubbing causes damage to the skin and tissue.
- After the affected area has been warmed, it may become puffy and blister. The affected area may have a burning feeling or numbness. When normal feeling, movement, and skin color have returned, the affected area should be dried and wrapped to keep it warm.
- Seek medical attention as soon as possible.



Hazard: Cold Stress (*continued*)

Hypothermia

What Happens to the Body: Normal body temperature (98.6° f/37° c) drops to or below 95° f (35° c); fatigue or drowsiness; uncontrolled shivering; cool bluish skin; slurred speech; clumsy movements; irritable, irrational or confused behavior.

What Should Be Done: (land temperatures)

- Call for emergency help (i.e., Ambulance or Call 911).
- Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace with warm, dry clothing or wrap the person in blankets.
- Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. **Avoid drinks with caffeine** or alcohol.
- Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. **DO NOT** rub the person's body or place them in warm water bath. This may stop their heart.



Hazard: Cold Stress (*continued*)

- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries.
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker.
- Train the workforce about cold-induced illnesses and injuries.
- Select proper clothing for cold, wet, and windy conditions. Layer clothing to adjust to changing environmental temperatures. Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene).
- Take frequent short breaks in warm dry shelters to allow the body to warm up.
- Perform work during the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system (work in pairs).
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.
- Eat warm, high-calorie foods like hot pasta dishes.



Hazard: Sunburn

- Prevent overexposing skin
- Sunglasses, if used, must be ANSI approved for use as safety glasses
- Use sunscreen and lip balm
- Use protective eyewear
- Limit exposure



Sunburn reduces responder readiness and increases the likelihood of skin cancer.



Hazard: Noise

- Wear appropriate hearing protection in noisy work environments
 - Examples: saws, earth-moving equipment, pneumatic tools





Hazard: Inhalation of Dust Containing Asbestos, Silica and Other Toxins

- Jobs affected
 - Debris removal and dumping
 - Loading trucks
 - Demolition
- Protection
 - Appropriate respiratory protection

If in doubt about respirators, see your supervisor.



Hazard: Carbon Monoxide Inhalation

Symptoms: Headache, dizziness, drowsiness, or nausea; progressing to vomiting, loss of consciousness, and collapse, coma or death under prolonged or high exposures.

Carbon Monoxide has no warning properties; it is a colorless, odorless gas!

Areas affected from gasoline- or propane-powered generators or heavy machinery:

- Near operating equipment
- Near generators
- Fire pits
- Debris reduction sites
- Burning and compacting



Hazard: Chemicals

- Of NY's and NJ's 198 Superfund toxic-waste sites, 45 are within a half-mile of coastal areas vulnerable to storm surge, including Gowanus Canal in NY.
- Raw sewage, industrial chemicals and floating debris filled flooded waterways around New York City.



Stormwater mixed with sewage spilled from the Gowanus Canal in the wake of Hurricane Sandy.



Potential Chemical Exposures

Symptoms: Eye, nose, throat, upper respiratory tract, and skin irritation; flu like symptoms; central nervous system depression, fatigue, loss of coordination, memory difficulties, sleeplessness, mental confusion. Chronic effects depend on the extent and the duration of exposure.



Jobs affected

- Debris removal
- Site clean-up



Protection

- Hazard specific as identified by supervisor or safety officer





Hazard Communication





Hazard: Mold

After hurricanes and floods, the water creates the perfect environment for mold to grow in homes and other buildings. Exposure to mold can cause wheezing and severe nasal, eye and skin irritation.



Hazard: Trench Foot (Immersion Foot)

- Trench foot, also known as immersion foot, occurs when the feet are wet for long periods of time. It can be quite painful.
- Symptoms include a tingling and/or itching sensation, pain, swelling, cold and blotchy skin, numbness, and a prickly or heavy feeling in the foot. The foot may be red, dry, and painful after it becomes warm. Blisters may form, followed by skin and tissue dying and falling off. Obtain medical assistance as soon as possible.
- To prevent trench foot, when possible, air-dry and elevate your feet, and exchange wet shoes and socks for dry ones.



Hazard: Blood-borne Disease

- Use impervious gloves when handling human remains
- Replace gloves if punctured or torn
- Protect yourself from injured persons' blood and bodily fluids
- Do not handle human remains if you have skin cuts or punctures



Hazard: Handling Bodies of Victims

- There is no direct risk of infectious disease from being near human remains for people who are not directly handling dead bodies.
- Human remains may contain blood-borne viruses such as hepatitis viruses and HIV, and bacteria that cause diarrheal diseases, such as shigella and salmonella.
- For personnel exposed to blood and body fluids:
 - Use gloves when handling bodies or body fluids
 - Use eye protection, gowns, and masks when large quantities or splashes of blood are anticipated
 - Wash hands frequently
 - Use body bags to reduce the risk of contamination



Hazard: Food-borne Disease

- **Identify and throw away food that may not be safe to eat:**
 - Food that may have come in contact with flood or storm water
 - Food that has an unusual odor, color, or texture
 - Meat, poultry, fish, eggs and leftovers that have been above 40 degrees Fahrenheit (F) for 2 hours or more
 - Food containers with screw-caps, snap-lids, crimped caps (soda pop bottles), twist caps, flip tops, snap-open, and home canned items
 - These cannot be disinfected if they have been in contact with floodwater
- **Store food safely**
 - While the power is out, keep the refrigerator and freezer doors closed as much as possible
 - Add block ice or dry ice to your refrigerator if the electricity is expected to be off longer than 4 hours. Wear heavy gloves when handling ice





Hazard: Water-borne Disease

Communicable disease outbreaks of diarrhea and respiratory illness can occur when water and sewage systems are not working and personal hygiene is hard to maintain as a result of a disaster.

***Wash Your Hands Often
With Soap and Use
Water-Free Sanitizers!!***





Hazard: Animals and Insects

- **Protect yourself from mosquitoes:**
 - Use screens on dwellings
 - Wear long pants, socks, and long-sleeved shirts
 - Use insect repellents that contain DEET or Picaridin
- **Beware of wild or stray animals:**
 - Avoid wild or stray animals. Call local authorities to handle animals
 - Get rid of dead animals according to local guidelines
 - Wear and clean proper protective clothing when handling carcasses
- **Fire ants and spiders**





Hazard: Snakes and other reptiles

- Be on the alert for snakes that may be hiding in unusual places after flooding
 - Wear snake chaps
 - If you are bitten, seek immediate medical attention





Hazard: Poisonous Plants

- Train workers on hazardous plant recognition
- Use gloves and wear long pants and long-sleeved shirts when possibility of contacting poisonous plants
- *Clothes, shoes, and tools may become contaminated by coming in contact with poisonous plants.*



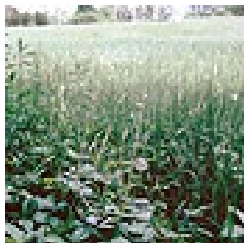
summer



spring



fall



where it grows



it's a bush



it creeps



it climbs



at the beach

Hazard: Traumatic Stress

- Pace yourself and take frequent rest breaks.
- Watch out for each other. Co-workers may not notice a hazard nearby or behind.
- Be conscious of those around you. Responders who are exhausted, feeling stressed, or even temporarily distracted may place themselves and others at risk.
- Maintain as normal a schedule as possible: ***regular eating and sleeping are crucial.***
- Make sure that you drink plenty of fluids such as water and juices.
- Try to eat a variety of foods and increase your intake of complex carbohydrates (for example, breads and muffins made with whole grains, granola bars).
- Whenever possible, take breaks away from the work area. Eat and drink in the cleanest area available.

Traumatic Stress (continued)

- Recognize and accept what you cannot change—the chain of command, organizational structure, waiting, equipment failures, etc.
- Talk to people when ***YOU*** feel like it. You decide when you want to discuss your experience. Talking about an event may be reliving it. Choose your own comfort level.
- If your employer provides you with formal mental health support, use it!
- Give yourself permission to feel rotten: You are in a difficult situation.
- Recurring thoughts, dreams, or flashbacks are normal—do not try to fight them. They will decrease over time.
- Communicate with your loved ones at home as frequently as possible.

Traumatic Stress (continued)

What you can do at home

- Reach out—people really do care
- Reconnect with family, spiritual, and community supports
- Consider keeping a journal
- Do not make any big life decisions
- Make as many daily decisions as possible to give yourself a feeling of control over your life
- Spend time with others or alone doing the things you enjoy to refresh and recharge yourself
- Be aware that you may feel particularly fearful for your family. This is normal and will pass in time
- Remember that "getting back to normal" takes time. Gradually work back into your routine. Let others carry more weight for a while at home and at work.

Traumatic Stress (*continued*)

What you can do at home

- Be aware that recovery is not a straight path but a matter of two steps forward and one back. You will make progress.
- Appreciate a sense of humor in yourself and others. It is OK to laugh again.
- Your family will experience the disaster along with you. You need to support each other. This is a time for patience, understanding, and communication.
- Avoid overuse of drugs or alcohol. You do not need to complicate your situation with a substance abuse problem.
- Get plenty of rest and normal exercise. Eat well balanced, regular meals.



Other Protective Measures

Key items to have:

- Insect repellent with Deet or Picaridin
- PPE – For information on what equipment you need for protection, contact your local OSHA office or NIOSH
- Personal floatation device
- Earplugs
- Bottled water
- Sun screen
- Rain Gear
- Pocket Knife (*put in your checked luggage*)



Additional Information

- This training program is based on recommendations from FEMA, NIEHS, NIOSH, OSHA, CDC and the USACE
 - You can find a link to their fact sheets and other important information at the National Clearinghouse for Worker Safety and Health Training website,
<http://tools.niehs.nih.gov/wetp/>.



Summary

- The hazards and issues are dynamic and require vigilance and flexibility
- The key to a safe response is attention to the safety issues of your work environment
 - The physical hazards are similar to any construction or demolition site
 - The health hazards include the hazards associated with the environment