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DEPARTMENT OF INTERIOR EMERGENCY RESPONSE & RECOVERY ACTIVITIES

STORMS, FLOODS, & HURRICANES SAFETY & HEALTH GUIDANCE

PRODUCED BY:

OFFICE OF OCCUPATIONAL SAFETY & HEALTH

&

OFFICE OF EMERGENCY MANAGEMENT

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Safety & Health Guidance for DOI Personnel Responding to and Recovering from Storms, Floods and Hurricanes

Storm, flood and hurricane response and recovery work can be hazardous. DOI employees and volunteers involved with this kind of work should be aware of the potential dangers involved, and the proper safety precautions. Work-related hazards that could be encountered include: electrical hazards, Carbon Monoxide, musculoskeletal hazards, heat stress, motor vehicles, hazardous materials, fire, confined spaces and falls. This information is intended to help personnel prepare for anticipated response and recovery activities, and to prevent work-related injuries and illnesses while doing this work.

The information contained within this guidance document was obtained from the following agencies: Occupational Safety & Health Administration, U.S. Department of Health & Human Services, and the Centers for Disease Control and Prevention.

Medical Screening

Prior to deployment/engaging in response/recovery activities, personnel should get medically screened and discuss the immunizations they may need with their healthcare provider.

Pre-exposure Medical Screening

The primary goal of medical screening is to evaluate a worker's fitness to perform potentially hazardous or stressful work safely. It is important to get screened by a health care provider to ensure one is able to handle the potential stressful and hazardous work that will be done while deployed/dealing with the response or recovery. An individual's personal healthcare provider is the best person to go to for medical screening since they are more aware of one's health issues/conditions that could present problems while working in arduous or stressful work environments. Medical screening is used for the following purposes:

- To assess the ability to use **P**ersonal **P**rotective **E**quipment (PPE).
- To determine a worker's immunization status.
- To document a worker's baseline health status when interpreting subsequent evaluation results.
- To identify risk factors that should be mitigated before or during disaster work.

Who needs to be screened?

- All personnel who will be deployed or will move from usual activities to response activities.
- Personnel who are not in existing medical screening programs should be screened.
- Personnel who are currently in medical screening programs for their work should be re-screened, if feasible, but may not need additional screening if circumstances require immediate deployment or re-assignment, or if the interval since their most recent screening is sufficiently short.

What type of screening should be done?

- Screening varies depending on expected activities, working conditions, and potential exposures.

Immunizations

Personnel should discuss immunizations with their primary care providers and ensure they are up to date on recommended vaccines prior to performing response activities. Immunization recommendations vary by age, gender, underlying medical condition, and exposures/occupation.

- Recommended Immunizations for ALL personnel:
  - Tetanus: Personnel should receive a tetanus booster if they have not been vaccinated for tetanus during the past 10 years. ***Td*** (tetanus/diphtheria) or ***Tdap*** (tetanus/diphtheria/pertussis) can be used; **while documentation of vaccination is preferred, it should not be a prerequisite to work.**
  - Influenza**:** While exposure to floodwaters does not increase risk of the flu, personnel are strongly encouraged to get a flu vaccine unless it is not recommended by your doctor.

- Immunizations for specific exposures/situations only (consult with health care provider):
  - Hepatitis B: Hepatitis B vaccine series is recommended for persons who will be performing direct patient care or otherwise expected to have contact with bodily fluids.
  - Hepatitis A vaccine (low probability of exposure in US). Working in sewage-contaminated floodwater may put a worker at increased risk for Hepatitis A. This vaccine will take at least one to two weeks to provide substantial immunity.
  - Typhoid vaccine (low probability of exposure in US). Typhoid fever is most often acquired through consumption of food or water that has been contaminated by feces of an infected person.
  - Meningococcal vaccine (no expectation of increased risk of meningococcal disease among emergency personnel).
  - Rabies vaccine series (the full series is required for protection). Persons who are exposed to potentially rabid animals should be evaluated and receive standard post-exposure prophylaxis, as clinically appropriate.

Personal Protective Equipment and Clothing

Debris, flood waters, damage to infrastructure and other impacts from hurricanes have created many hazardous conditions that those in the hurricane impact zones are faced with. It is important for personnel to protect themselves from these hazards. This information is intended to help personnel prepare for anticipated response and recovery activities, and to prevent work-related injuries and illnesses while doing this work

Personal **P**rotective **E**quipment (PPE) is equipment that provides a protective barrier between you and the hazard. It's important to not only wear this PPE when working in hazardous environments but that it properly fits the user – or it will not provide good protection. The National Institute for Occupational Safety and Health (NIOSH) provides the following guidelines and warnings to flood cleanup personnel. This guidance represents professional judgment based on experience from past storm and flood responses.

- Hazards in flood waters can include: sewage, household chemicals and cleaning solutions, petroleum products, hazardous industrial chemicals, pesticides, and flammable liquids.
- Avoid direct skin contact with flood waters, if possible, through the use of appropriate PPE and clothing.
- Personnel must be aware of dangers from physical hazards such as obstacles covered by flood waters (storm debris, depressions, drainage openings, ground erosion) and from displaced reptiles or other animals.

Selection of PPE will be dependent on site specific conditions, hazards, and tasks; ***the list below provides guidance on PPE and clothing for flood response personnel***:

- Electrically insulated, watertight boots with steel shank, toe, and insole.
  - Tennis shoes or sneakers should not be worn – they will transfer contamination and will not prevent punctures, bites, or crush injuries.
- Hip waders may be appropriate to help prevent contact with flood waters.
- Heavy, waterproof, cut-resistant work gloves. Other types of protective gloves may be required if handling identified material hazards.
- Goggles, safety glasses w/side shields or full-face shields. Sun/glare-protective lenses may be needed in some settings;
- Soft hat or other protective head cover. Wear an American National Standards Institute (ANSI) rated hardhat if there is any danger of falling debris or electrical hazards.
- Hearing protection (when working in an environment with any noise that you must shout over to be heard).
- Comfortable, form fitting, light weight clothing including long pants and a long-sleeved shirt or coveralls.
- Under some work conditions, NIOSH approved respirators may be necessary (e.g., for exposures to mold-contaminated materials/environments, or other recognized chemical, physical, or biological hazards).

		Job TASKS					
PPE		Normal Cleanup Activities	Working in Wet Conditions	Working with Chain Saws	Working Near/Over Water	Working at Heights Over 6 ft.	Working Near Loud Noise
Head	Hard Hat	X	X	X	X	X	X
Eyes	Safety Glasses	X		X	X	X	X
	Safety Goggles		X				
Face	Face Face Shield			X			
Ears	Hearing Protection			X			
Hands	Work Gloves	X		X	X	X	X
	Latex/Rubber Gloves		X				
Body	Hi-Visibility Garment	X	X	X	X	X	X
	Impervious Body Suit		X				
	PFD and Life Ring				X		
	Chaps			X			
	Fall Protection					X	
Feet	Steel Toe Boots	X		X	X	X	X
	Waterproof		X				
Other PPE	PPE Workboat/Skiff				X		

NOTE: This guidance is not a comprehensive list of protective measures. Additional PPE, respiratory protection, or clothing may be required when specific exposure hazards are identified or expected at the work site.

- In some instances, the protective ensemble components (garment, boots and gloves) may need to be impervious to contaminated flood/other site-specific chemical, physical, or biological hazards.
- Waders should be cleaned with soap and water and air dried between uses.
- In all instances, personnel are advised to wash their hands with soap and clean water, especially before eating or drinking.
- Alcohol-based hand sanitizers can be used if soap and water are not available.
- Protect any cuts or abrasions with waterproof gloves and dressings.
- The use of insect repellant, sun block and lip balm may also be required for some work environments.
- Drink plenty of bottled water and take frequent rest breaks to avoid overexertion.

Injury and Illness Reporting

- Report all workplace injuries and illnesses to your supervisor, regardless of severity, and have them enter the report electronically via the Department's Safety Management Information System (SMIS). SMIS is located at www.smis.doi.gov and is available 24/7.
- Employees can also use SMIS to electronically file personnel compensation claims.
- Serious injuries or illnesses must be reported as soon as possible through established incident reporting procedures. Serious injuries and illnesses include: an employee on-duty fatality, amputation injury, loss of an eye, or in-patient hospitalization of one or more employees.
- Departmental notification will be made to the DOI Interior Operations Center Watch Office (**Toll free** (877) 246-1373/ **Voice** (202) 208-4108/ **Fax** (202) 208-3421/ or **Email** doi_watch_office@ios.doi.gov).

General Safety and Health Guidance

- Take frequent rest breaks when lifting heavy, water-laden objects.
- Avoid overexertion and practice good lifting techniques. To help prevent injury, use teams of two or more to move bulky objects; avoid lifting any materials that weigh more than 50 pounds per person, and use proper automated lifting assistance devices if practical.
- When working in hot environments, have plenty of drinking water available, use sunscreen, and take frequent rest breaks. Wear light-colored, loose-fitting clothing.
- Have a first-aid kit available to disinfect any cuts/abrasions. Protect open cuts/abrasions with waterproof gloves or dressings.
- Wash hands often during the day, especially before eating, drinking, or applying cosmetics.
- Conduct a preliminary worksite inspection to verify stability before entering a flooded or formerly flooded building or before operating vehicles over roadways or surfaces.
    - Do not work in or around any flood damaged building until it has been examined and certified as safe for work by a registered professional engineer or architect.
- Use a wooden stick or pole to check flooded areas for ***pits, holes, and protruding objects before entering***.
- Ensure all ladders and scaffolds are properly secured prior to use.
- Washouts, trenches, excavations, and gullies must be supported or their stability verified prior to entry.
- All trenches should be supported (e.g., with a trench box); if no support is available, the trench must be sloped at no less than a 1:1 (45°) angle for cohesive soil and angular gravel and a 11/2:1 (34°) angle for granular soils including gravel, sand, and loamy sand or submerged soil or soil from which water is freely seeping.
- Establish a plan for contacting medical personnel in the event of an emergency.
- Report any obvious hazards (downed power lines, frayed electric wires, gas leaks or snakes) to appropriate authorities.
- Use fuel-powered generators outdoors. Do not bring them indoors, as they may pose a carbon monoxide (CO) hazard.
- Use life vests when engaged in activities that could result in deep water exposure.
- Use extreme caution when handling containers holding unknown substances or known toxic substances (for example, floating containers of household or industrial chemicals). Contact the EPA (Environmental Protection Agency) for information on disposal at the National Response Center (800) 424-8802.
- Do NOT use improvised surfaces (e.g., refrigerator racks) for cooking food or for boiling water to avoid exposure to heavy metals.

Disaster Site Safety

Tree Care Work

Initial actions

Before beginning any tree care operation, the following actions need to occur:

- Assess the work site for ***fall and falling object hazards***.
    - Assess the sloped ground where ladders or equipment will be used to prevent falls from equipment overturns and ladder slippage; nearby overhead objects or structures; and weather-related hazards.
- Have a qualified ***arborist*** survey the worksite and identify the types of trees involved and hazards related to tree structure.
    - The qualified arborist would identify fall hazards and falling object hazards due to tree condition. The American National Standard Institute's (ANSI) Z133 consensus standard on tree care work defines "qualified arborist."
- Determine if ***rigging*** is necessary and, if so, that personnel can use it safely. This determination helps prevent sections of the tree from falling while performing tree care work.
- Determine if personnel will need to climb or use aerial lifts. In making this determination, ensure that:

  Ladders are:
    - Well maintained and not defective, such as having missing or broken parts.
    - Kept at least 10 feet away from power lines and other electric equipment. For lines and equipment over 50 kV, the distance should be 10 feet plus 4 inches for every 10 kV over 50 kV.
    - Inspected before each use, and remove damaged or defective ladders.
    - Secured to avoid slippage.
    - Used according to the manufacturer's instructions.

  Aerial lifts are:
    - Maintained and properly set up for use;
    - Used according to the manufacturer's instructions;
    - Not used as cranes to lift or hoist tree parts or material unless designed for that purpose;
    - Only used with fall protection equipment including tie-off; and
    - Kept at least 10 feet away from power lines and other electric equipment. For lines and equipment over 50 kV, the distance should be 10 feet plus 4 inches for every 10 kV over 50 kV.

  Personnel who climb trees are trained on:
    - Climbing techniques;
    - Using climbing spurs with gaffs that are compatible with the tree they will climb;
    - Using a second means of fall protection such as a work-positioning lanyard or a second climbing line, in addition to using an arborist climbing line;
    - Lifting and lowering hand tools and equipment; and
    - Carrying only hand tools and equipment that are necessary for climbing.
- Identify and provide properly fitting personal protective equipment to protect personnel from fall and overhead falling object hazards, and ensure that the personnel use the equipment and are trained in its proper use.
- Only use climbing equipment approved by the manufacturer for tree care work, including climbing lines, safety lines, personal fall protection equipment
    - Inspect all equipment for safe operation before starting work; remove damaged, defective, or worn equipment from service.
- Ensure all personnel at a tree care operation are trained in hazard recognition for falls from elevation and falling object hazards, and the use of PPE, such as ***hard hats***, to protect against injury from overhead falling objects.
- **Note**: If personnel cannot remain at least 10 feet from electric lines to perform tree care operations, contact the utility company to de-energize and ground the lines.

Safe work practices

Take the following steps to protect personnel from falling object hazards:

- Establish and mark drop zones with equipment, such as cones, where there is a hazard of objects falling.
- Ensure all personnel receive training on procedures for entering the drop zone.
- Ensure ground personnel maintain a ***distance away from tree-felling operations*** *at least two times the height of the tree*.
- When using a rope to fell a tree, ***personnel must be a distance of at least*** *one-and-a-half times the height of the tree* ***being felled***.
- Establish a visual or audible communication system between overhead personnel and personnel on the ground before starting rigging operations for piecing out the tree.
    - The system must effectively communicate when employees who are beneath overhead tree personnel should stand clear of the drop zone, and when it is safe to approach a drop zone. A worker trained in emergency procedures needs to be within visual or voice communication with the worker climbing and working in a tree above 12 feet in height.
- Provide traffic and pedestrian traffic control around the jobsite prior to the start of the tree care operation.
- Have emergency procedures in place prior to the start of the tree care operation. Determine if the worksite location has cellular telephone coverage and verify that every worker knows the address of the worksite in case they need to summon emergency services to the site. Establish a retreat path for ground personnel so they can escape from falling trees.

Chain Saws

Operating a chain saw can be hazardous. Potential injuries can be minimized by using proper personal protective equipment and following safe operating procedures.

Before use

Before starting a chain saw, perform the following actions:

- Check controls, chain tension, and all bolts and handles to ensure that they are functioning properly and that they are adjusted according to the manufacturer's instructions.
- Make sure that the chain is always sharp and that the oil tank is full.

Fueling

- Use approved containers for transporting fuel to the saw.
- Dispense fuel at least 10 feet away from any sources of ignition when performing construction activities. No smoking during fueling.
- Use a funnel or a flexible hose when pouring fuel into the saw.
- Never attempt to fuel a running or HOT saw.

Starting

- Start the saw on the ground or on another firm support. Drop starting is never allowed.
- Start the saw at least 10 feet from the fueling area, with the chain's brake engaged.

Safe work practices

- Clear away dirt, debris, small tree limbs and rocks from the saw's chain path. Look for nails, spikes or other metal in the tree before cutting.
- Shut off the saw or engage its chain brake when carrying the saw on rough or uneven terrain.
- Keep your hands on the saw's handles, and maintain balance while operating the saw.
- Proper PPE must be worn when operating the saw, which includes hand, foot, leg, eye, face, hearing and head protection.
- Do not wear loose fitting clothing.
- Be careful that the trunk or tree limbs will not bind against the saw.
- Watch for branches under tension; they may spring out when cut.
- Gasoline powered chain saws must be equipped with a protective device that minimizes chain saw kickback.
- Be cautious of saw kickback. To avoid kickback, do not saw with the tip. Keep tip guard in place.

Chipper Machines

Chipper machines cut tree limbs into small chips.

- Hazards arise when operators get too close to, or make contact with, the chipper.
- Contact with chipper operating components (blades, discs or knives) may result in amputation or death.
- Operators may also be injured by material thrown from the machine. To minimize these hazards, use appropriate engineering and work practice controls, including operator training.

Hazards

- Operators making contact with or being pulled into the chipper.
- Hearing loss.
- Face, eye, head or hand injuries.

Safe work practices

- Never reach into a chipper while it is operating.
- Do not wear loose-fitting clothing around a chipper.
- Always follow the manufacturer's guidelines and safety instructions.
- Use earplugs, safety glasses, hard hats and gloves.
- Personnel should be trained on the safe operation of chipper machines. Always supervise new personnel using a chipper to ensure that they work safely and never endanger themselves or others.
- Protect yourself from contacting operating chipper components by guarding the infeed and discharge ports, and preventing the opening of the access covers or doors until the drum or disc completely stops.
- Prevent detached trailer chippers from rolling or sliding on slopes by chocking the trailer wheels.
- Maintain a safe distance (i.e., two tree or log lengths) between chipper operations and other tree work or personnel.
- When servicing and/or maintaining chipping equipment (i.e., "unjamming") use a lockout system to ensure that the equipment is de-energized.

Ladders

Ladder use can create a falling hazard.

- Before each use, inspect ladders for cracked, broken, or defective parts.
- Use only ladders that comply with OSHA ladder standards.

Safe work practices

Make sure your ladder is secure by following these guidelines:

- 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
- Make sure that the weight on the ladder will not cause it to slip off its support.

Tarping

Blue Tarps" are designed to temporarily protect a building until a permanent roof is constructed. Inspect roofs and install blue tarping, if necessary, as temporary protection from the elements.

Safe work practices

The tasks include inspections, setting up access (ladders), and installing the blue tarp.

- Provide fall protection where feasible, at a minimum provide safety monitors.
- Properly set up and use ladders in accordance with the ladder section and/or 29 CFR 1926.1053.
- Unless the electrical power lines have been de-energized and visibly grounded, maintain proper distance from electrical power lines (at least 10 feet) and/or provide insulating barriers.
- PPE to include eye protection and work boots
- Conduct task specific training Hand and power tool safety

Physical Hazards & Risks

Personnel involved with hurricane or flood response and recovery activities should be aware of the dangers involved and what safety precautions should be taken.

Sharp, Jagged Debris

- Personnel handling hurricane related debris may suffer wounds. Tetanus is a potential health threat for persons who sustain wound injuries. Also, any wound has the potential for becoming infected, and floodwater exposures may add to this concern.

PPE Recommendations

- Use heavy gloves to protect the hands when handling debris to minimize the chances of cuts and scrapes.
- Gloves designed to protect the skin from chemical exposure are not typically strong enough to protect from debris.
- Multiple layers of gloves (***double gloving***) may be necessary.
- Comfortable, form fitting clothing that includes long pants, long sleeve shirts, boots, eye protection (safety glasses, goggles, or faceshields), and protective head covers are also appropriate.

Tetanus

- Exposure to flood waters ***does not increase the risk of tetanus***.
- However, some people impacted by floods and other disasters may have wounds – such as puncture to the skin, cuts, bruises, lacerations, scrapes, or other skin injuries that become contaminated by flood waters, human or animal wastes, soil, dirt, or saliva.

Risk of Tetanus to Emergency Personnel, Clean-up personnel, Volunteers

- During evacuation and flood cleanup, emergency personnel, cleanup personnel, and volunteers may be at increased risk for wounds (*as described above*).
- Personnel should know their vaccination status and make sure that they are up to date.
- Those with current vaccinations do not require prophylaxis w/tetanus immune globulin (TIG).

Tetanus Protection

- Vaccination prevents tetanus.
- Tetanus vaccines are recommended for people of all ages.
- Tetanus vaccines are routinely recommended during infancy at 2, 4, and 6 months of age, with booster doses at ages 15-18 months, 4-6 years, and 11-12 years.
    - *Protection acquired against tetanus after vaccination* during childhood, or from a prior infection, *does not last a lifetime*.
- Adults need an age-appropriate tetanus ***booster shot every 10 years*** to maintain protection. Being up to date with your tetanus vaccine is the best tool to prevent tetanus.

Falls

- Employees shall be protected from ***falls greater than six feet*** to a lower level. Fall protection such as guardrails, coverings over floor holes, or personal fall arrest systems shall be installed conforming to *29 CFR 1926 Subpart M*.
- A qualified person must determine if the walking / working surface is adequate to support the weight of personnel, tools, and materials. This is important in areas compromised by floodwaters or suffered structural damage from high winds.

- Use of ***scaffolds*** shall conform to *29 CFR 1926 Subpart L*. Use of ***ladders*** shall conform to 29 CFR 1926 Subpart X. The use of aerial lifts & scissor lifts shall conform to the applicable portions of 29 CFR 1926 as well as relevant ANSI standards.
- Personnel shall pay extra attention to the walking / working surfaces to minimize slip/trip/fall hazards. Extra care should be exercised when stepping into areas that are unstable or uneven, such as debris field, or where the surface cannot be visualized (i.e., if covered by water).
- Objects that may dislodge and fall, especially broken glass, present a serious hazard to employees. When possible, such objects or glass should be removed before employees work beneath them. If objects cannot be removed, then controls such as debris netting, sidewalk sheds, canopies, or catch platforms shall be installed.
  General rule: If an employee can fall six feet or more onto a lower level, fall protection must be provided.

Electrical Hazards

Electrical, overhead power lines, power junctions, and downed electrical wires and cables can cause electrocution and burns.

- Fallen lines can also energize other objects such as fences, ladders, or metal building parts.
- If damage to an electrical system is suspected (for example, if the wiring has been under water, you can smell burning insulation, wires are visibly frayed, or you see sparks), turn off the electrical system in the building and follow lockout/tagout procedures before beginning work.
  - Do NOT turn the power back on until electrical equipment has been inspected by a qualified electrician.
- Use of improperly sized or operated portable generators during electrical outages can also cause "backfeed" injuries to personnel performing repair work in neighboring buildings.

Safe work practices

- Only trained electricians and utility personnel should approach or handle electrical lines. All other response personnel should avoid going near all downed lines and should treat them as if energized.
- Beware of overhead and underground power lines when clearing debris. Extreme caution is necessary when moving ladders and other equipment near overhead power lines to avoid inadvertent contact.
- Treat all power lines as energized until you are certain that the lines have been de-energized.
- Do NOT touch downed power lines or any object or water that is in contact with such lines.
- ***Stay at least 10 feet (3 meters) away*** from overhead wires during cleanup and other activities. If working at heights or handling long objects, survey the area before starting work for the presence of overhead wires.
- De-energized power lines may become energized by a secondary power source such as a portable backup generator.
- Ground-fault circuit interrupters (GFCIs) must be used in all wet locations. Portable GFCIs can be bought at hardware stores.
- Ensure all electrical equipment, including extension cords, used in wet environments are marked, as appropriate, for use in wet locations. Be sure that all electrical connections are kept dry and out of water.
- Have a qualified electrician inspect electrical equipment that has gotten wet before energizing it.
- All electrical equipment must be inspected for any damage before use; immediately remove from service all damaged electrical equipment.
- Never start or operate electrical equipment while it or you are in water.
- Never repair electrical cords or equipment unless qualified and authorized to do so.

PPE Recommendations

- Electricians and utility personnel need to use special electrically resistant PPE including head covers, gloves, boots, and appropriate eye protection.
- Special electrical PPE is only one aspect of electrical safety practice. Special training and practices to test, de-energize, isolate, and/or lockout hazardous energy sources are important.

Portable Generator Safety

Portable generators are used to generate electricity and are commonly used during disaster response. Portable generators can be dangerous if used incorrectly.

Major causes of injuries and fatalities

- Shocks and electrocution from improper use of power or accidentally energizing other electrical systems.
- Carbon monoxide from a generator's exhaust.
- Fires from improperly refueling the generator or inappropriately storing fuel.

Carbon Monoxide Poisoning

- Carbon monoxide (CO) is a colorless, odorless, toxic gas.
- Many personnel have died from CO poisoning because their generator was not adequately ventilated.
- Never use a generator indoors.
- Never place a generator outdoors near doors, windows, or vents. Maintain a safe distance of at least 20 feet.
- If you or others show symptoms of CO poisoning—dizziness, headaches, nausea, tiredness—get to fresh air immediately and seek medical attention.

Safe Work Practices

- Inspect portable generators for damage or loose fuel lines that may have occurred during transportation and/or handling.
- Keep the generator dry.
- Maintain and operate portable generators according to the manufacturer's use and safety instructions.
- ***Never attach a generator directly to the electrical system of a structure*** (home, office or trailer) unless the generator has a properly installed transfer switch because this creates a risk of electrocution for utility personnel.
- Always plug electrical appliances directly into the generator using the manufacturer's supplied cords.
- Use undamaged heavy-duty extension cords that are grounded (3-pronged).
- Use ground-fault circuit interrupters (GFCIs) as per the manufacturer's instructions.
- Before refueling, shut down the generator. Never store fuel indoors.

Slick and Unstable Surfaces

Traumatic injuries, including serious fall injuries, from slips, trips and falls, or collapsing materials are possible.

PPE Recommendations

- Ensure personnel have a full array of PPE, including safety shoes with slip resistant soles, cut resistant gloves, eye protection, and hard hats.
- Ensure personnel use full PPE and lifelines tied off to suitable anchor points, including bucket trucks, whenever possible.

Structure Safety

Do not enter a structure that shows indication of being unsafe –such as walls with large cracks, shifting, or partial collapse.

Safe work practices

- Consider entering the structure ***during daytime*** especially if it is without electricity and you have no lights.
- Determine if any hazardous substances have been anywhere on the property including pipes and tanks.
- Ensure appropriate utilities have been notified prior to entering and starting any demolition work.
  - If it is necessary to maintain any power, water or other utilities during demolition, such lines shall be temporarily relocated, as necessary, and protected.
- Immediately leave the structure if unusual sounds (indication of shifting) or smells (possible gas leak) are noticed.
- Prior to permitting employees to start demolition operations, an engineering survey shall be made, by a competent person, of the structure to determine the condition of the framing, floors, and walls, and possibility of unplanned collapse of any portion of the structure.
  - Any adjacent structure where employees may be exposed shall also be similarly checked. Written evidence that such a survey has been performed shall be maintained.
- When employees are required to work within a structure to be demolished, which has been **damaged by fire, flood, explosion, or other cause**, the walls or floor shall be shored or braced.
- All electric, gas, water, steam, sewer, and other service lines shall be shut off, capped, or otherwise controlled, outside the building line before demolition work is started.
- Structural or load-supporting members on any floor shall not be cut or removed until all stories above such a floor have been demolished and removed. This provision shall not prohibit the cutting of floor beams for the disposal of materials or for the installation of equipment, provided that the requirements of 1926.853 and 1926.855 are met.

Floodwater exposure

Floodwaters may contain bacteria from human and animal wastes.

- Likely symptoms from an infection are ***stomach-ache, fever, vomiting and diarrhea***.
- While skin contact with flood water does not, by itself, pose a serious health risk, emergency response personnel and the public should avoid direct contact with standing water when possible to minimize the chance for infection.
- Chemical contamination of floodwaters can also occur and contamination levels may be higher nearer to sources such as industrial locations.
- Work in and around moving or standing water in flooded areas presents a risk of drowning. Standing or working in water which is cooler than ***75 degrees F (24 degrees C)*** will remove body heat more rapidly than it can be replaced, resulting in hypothermia.

PPE Recommendations

- Double gloving w/waterproof glove under a heavy work glove is the best way to protect hands from cuts, scrapes, and floodwater exposure. Should include an inner cut-resistant glove (nitrile or similar washable material) and an outer nitrile or latex disposable glove (***preferably 4 to 8 mil thickness***). Hands should be washed after removal of gloves.

- Boots/rain gear can be used to prevent lower body skin exposures. It's important to minimize contaminating inside of gloves.
- Gloves not disposed of should be cleaned with soap and water and dried between uses.
- Floodwaters are associated with strong odors, but experience in past floods and disease outbreak tracking do not suggest the need for a general recommendation for default respirator use by all personnel.
- As with all emergency operations, site specific information should be used to tailor recommendations to the hazards and exposures at hand. For example, use of N95 respirators might be advisable adjacent to aerated floodwater where mists are created- such as potential tasks associated with repair of pumping facilities or discharge pipes.
- Avoid working alone and wear a Coast Guard-approved life jacket or buoyant work vest when entering flood waters or working over or near flood waters.
- Wearing wet gloves/PPE can cause dermal irritation. Long exposures to wet conditions can compromise skin barrier function.
- Repeated use of impermeable gloves, especially in hot and humid conditions, can aggravate skin rashes. Cotton liners are sometimes used under protective gloves to improve comfort and to prevent dermatitis.
- Latex gloves should be avoided because of the risk of developing skin sensitivity or allergy.
- Open wounds and skin conditions such as eczema and psoriasis may increase your risk of infection.
- Contamination of wounds with water (fresh or sea water) can lead to infections caused by waterborne organisms.
- If skin contact with floodwaters occur, CDC strongly advises the use of soap and water to clean exposed areas. Waterless alcohol-based hand rubs can be used when soap or clean water is not available.

Contact with blood/body fluids and handling animal and human remains

There is no direct risk of contagion or infectious disease from being near human remains for people who are not directly involved in recovery or other efforts that require handling dead bodies. Personnel who must have direct contact with human remains can have exposure to blood borne pathogens.

- Blood, bloody fluids, body fluids, and tissues are potential sources of blood-borne infections from pathogens including ***Hepatitis B, Hepatitis C, and HIV***. Exposures to medical providers and personnel may occur via a cut or puncture wound; through mucous membranes (eye, nose, mouth); and through non-intact skin (dermatitis/rashes, injuries, abrasions).

PPE Recommendations

- Personnel who will have direct contact with the victims, or surfaces contaminated with blood or body fluids should use universal precautions. These require use of protective barriers such as gloves, face-shields, or protective eyewear.
- Organic vapor respirators can be used for nuisance odor control where needed. One option that provides odor control and universal precaution splash and eye protection is to use a full-face piece respirator with N95 and organic vapor cartridges.

Diseases - Diarrheal

Personnel should eat and drink only from approved safe food and water sources. Eating or drinking anything contaminated by flood water can cause diarrheal disease. To protect yourself,

- Practice good hygiene (handwashing) after contact with flood waters.
- Do not allow children to play in flood water areas.
- Wash children's hands frequently (always before meals).
- Do not allow children to play with toys that have been contaminated by flood water and have not been disinfected.

Infections - Wound

Open wounds & rashes exposed to flood waters can become infected. To protect yourself and your family:

- Avoid exposure to flood waters if you have an open wound; Cover open wounds with a waterproof bandage.
- Keep open wounds as clean as possible by washing well with soap and clean water.
- If a wound develops redness, swelling, or drainage, seek immediate medical attention.

Trench Foot

Trench foot, also known as immersion foot, is an injury of the feet resulting from prolonged exposure to wet and cold conditions. Trench foot can occur at temperatures as high as 60 °F if the feet are constantly wet. Injury occurs because wet feet lose heat 25-times faster than dry feet. Therefore, to prevent heat loss, the body constricts blood vessels to shut down circulation in the feet. Skin tissue begins to die because of lack of oxygen and nutrients and due to the buildup of toxic products.

Symptoms

Reddening of the skin	Numbness	Bleeding under the skin
Leg cramps	Tingling pain	Gangrene (the foot may turn dark purple, blue, or gray)
Swelling	Blisters or ulcers	

First Aid: Personnel suffering from trench foot should:

- Remove shoes/boots and wet socks.

- Dry their feet.
- Avoid walking on feet, as this may cause tissue damage.

Mold/Fungi Hazards

Flood conditions contribute to the growth and transmission of many kinds of fungi, some of which can cause sickness.

- Cleanup personnel are at increased risk of exposure to airborne fungi and their spores because they often handle moldy building materials, decaying vegetable matter, rotting waste material, and other fungus-contaminated debris.
- Fungal material is carried into the respiratory tract when airborne particles are inhaled.
- There are many different kinds of fungi, including ***mildew***, ***molds***, ***rusts***, and ***yeasts***. Most of these are harmless, but some can cause respiratory and other disorders when personnel inhale or come into contact with fungi.
- Greatest risk to individuals with: a weakened immune system, allergies, asthma, sinusitis, or other lung diseases.

Mold - How to Recognize

- ***Sight*** – Usually appear as colored woolly mats.
- ***Smell*** – Often produce a foul, musty, earthy smell.

Adverse health effects may include

- Allergic responses
- Aggravation of asthma attacks.

Symptoms of exposure, to include allergic reactions

Nasal stuffiness	Wheezing	Sneezing
Eye irritation	Cough/congestion	Skin rash

Protective measures and actions for all personnel who may be exposed to mold and fungi:

- Avoid breathing dust (fungal spores) generated by moldy building materials, crops, and other materials.
- Consider using an N-95 NIOSH-approved disposable respirator as a minimum when working with moldy or damp hay, grain, compost, or building materials. Respirator protection must be used in accordance with OSHA's Respiratory Protection standard (29 CFR 1910.134, Appendix D).
- Consider discarding all water damaged materials. Articles that are visibly contaminated with mold should be discarded

Cleaning up or renovating flooded buildings and homes.

- NIOSH-approved respirators are strongly recommended. Respiratory protection such as the ***N-95*** must be used in accordance with OSHA's Respiratory Protection standard (29 CFR 1910.134).
- Wear gloves and eye protection.
- Remove building materials and furnishings that are wet and may become contaminated with mold growth
  - Place in sealed impermeable bags or closed containers.
  - Large items with heavy mold growth should be covered with polyethylene sheeting and sealed with duct tape before being removed from the area.
- Remove and discard ***porous organic materials*** that have become wet or are visibly contaminated (e.g., damp insulation in ventilation system, moldy ceiling tiles, and mildewed carpets).
- All of these materials can be discarded as ordinary construction waste.

Non-porous materials (e.g., metal, glass, hard plastics, etc.).

- Can be dried out, fully cleaned and reused.
- Clean hard and non-porous materials using a detergent.
- Surfaces can be rinsed with a disinfectant made of *½ cup liquid household bleach mixed into one gallon of water.* Caution**:** DO NOT mix bleach with cleaning products that contain ammonia).

Semi-porous *materials (e.g., wood and concrete)*

- Can be cleaned if they are structurally sound.

Porous materials (e.g., drywall, carpets, insulation, ceiling tile, etc.) are different because mold penetrates into them making it very difficult to fully clean. As a general rule, if a porous material has been ***wet for over 48 hours,*** it's best to remove & replace.

General Cleaning and Disinfecting

- Clean and disinfect ***nonporous*** surfaces where microbial growth has occurred with detergents, chlorine-generating slimicides, or other biocides and ensure that these cleaners have been removed before air handling units are turned on.

- When using a biocide or disinfectant, consult the material safety data sheet (MSDS) or warning label for the appropriate personal protective equipment (PPE) that should be used when handling these chemicals.
- Chemical safety and handling must be done in accordance with OSHA's Hazard Communication standard (29 CFR 1910.1200).

When in doubt, throw it out.

- Surfaces that have a light covering of mold should be scrubbed with warm, soapy water and rinsed with a disinfectant made of 1/2 cup liquid household bleach mixed into one gallon of water.
  Caution: Do not mix bleach with other cleaning products that contain ammonia.
- After working with mold-contaminated materials, wash thoroughly, including the hair, scalp, and nails.
- If the safety of food or beverage is questionable, ***throw it out***. Only drink safe drinking water that has been bottled, boiled, or treated until there is confirmation that the community water supply is safe for consumption.

Mold Remediation – The size of the area is important.

Small Areas (i.e., < 30 ft.^{2})

- The work area should be unoccupied.
  - Removing people from adjacent spaces is not necessary but is recommended for infants, persons recovering from surgery, immune or asthma suppressed people, hypersensitivity pneumonitis and severe allergies.
  - Containment of the work area is not necessary.
- Cover surfaces in the work area that could become contaminated with secured plastic sheets to contain dust and debris, and prevent further contamination.

Large Areas (i.e., 30-100 ft.^{2})

- The work area and areas directly adjacent to it should be unoccupied.
- Cover surfaces in the work area and adjacent areas that could become contaminated with secured plastic sheets to contain spores, dust and debris to prevent further contamination.
- Seal ventilation ducts/grills in the work area and areas directly adjacent with plastic sheeting.
- If remediation procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of mold is heavy (i.e., blanket versus patchy coverage) follow the extensive contamination procedures below.

Extensive and Visible Mold

- Develop a suitable mold remediation plan.
  - ***The plan should address***: work area isolation, the use of exhaust fans with high-efficiency particulate air (HEPA) filtration, and the design of airlocks/decontamination room.
- Consult with industrial hygienists or other environmental health and safety professionals with experience performing mold remediation before beginning this level of remediation.

Worker Protection

Worker protection uses engineering controls, work practices and PPE during mold remediation. Inhalation is the route of exposure of most concern to cleanup personnel.

Engineering Controls

- Re-wetting materials with a mist of water to suppress spores, dust and debris.
- Wrap and seal the items that will be discarded in plastic bags or sheets to reduce the spread of spores.
- Provide natural or local exhaust ventilation during all cleaning steps.

Safe Work Practices

- Do not eat, drink, or smoke in work areas.
- Avoid breathing dusts.
- After an area has been cleaned and is completely dry, vacuum the area with a HEPA vacuum. HEPA vacuums are also recommended for cleaning up dust that may have settled on surfaces outside the work area.
- The work area and areas used by remediation personnel for egress should be cleaned with a damp cloth or mop and a detergent solution. Set up a decontamination area.
- Leave the area clean, dry and free of visible debris.
- After working, wash thoroughly, including hair, scalp and nails.

PPE

Respirators:

- For ***areas smaller than 100 ft.^{2}***; use an approved respirator, at a minimum, either a half-face or full-face N, R, or P-95 respirator.

- For ***areas greater than 100 ft.^{2}***, areas where mold is heavy (blanket coverage rather than patchy), or areas where substantial dust is generated during cleaning or debris removal (e.g., abrasives are used to clean surfaces); use an approved respirator, at a minimum, either a half-face or full-face N, R, or P-100 respirator.
- Charcoal-impregnated filters may be used for odors.
- Non-vented goggles.
- Long gloves made of material that will protect personnel from chemicals used for surface cleaning.
- Protective clothing (e.g., disposable coveralls) to prevent contamination and skin contact with mold and chemicals. For ***areas greater than 100 ft.^{2}***, ensure that protective clothing covers entire body including head and feet.

Decontamination

- During a flooding event, there is an increased danger of contracting bacterial, viral and protozoal diseases.
- Floodwaters can be contaminated with sewage and decaying animal and human remains. Therefore, disinfection of contaminated hands, clothing, tools/equipment, and surfaces in work areas is critical in disease prevention.
- Household bleach solutions of various strengths can be used for this purpose.

Hand Decontamination

- Wash hands completely with soap and water.
- Rub your hands together for at least 10 seconds (with soap if available). Wash all surfaces well, including wrists, palms, backs of hands, fingers, and under the fingernails.
- Clean the dirt from under your fingernails.
- Rinse the soap from your hands.
- Dry your hands completely with a clean towel if possible (this helps remove the germs).
- However, if towels are not available it is okay to air dry your hands.
- Pat your skin rather than rubbing it to avoid chapping and cracking.
- If you use a disposable towel, discard it in the trash.

Clothing, Tools and Equipment Decontamination

- Contaminated clothing, tools and equipment should also be cleaned.
- It is preferable that soap and clean water be used when available.
- If only contaminated water is available, use the following:
    - 1/4 cup bleach.
    - 1 gallon of water.
- Immerse objects in the solution for 10 minutes; if clothing, gently swirl every few minutes.
- If clothing, wring out as much moisture as possible.
- If tools or equipment, allow the object to drain and then transfer it directly to the bleach solution used for hand cleaning.
- Re-immerse the clothing in the household bleach solution used for hand cleaning for 10 minutes with periodic gentle swirling of the clothing.
- If clothing, wring out as much moisture as possible.
- Allow clothes to thoroughly dry before using again.

Severe Surface Decontamination

- Surfaces that are heavily contaminated with mold, feces, or body tissues should be disinfected using the following household bleach solution:
    - 11/2 cups bleach.
    - 1 gallon of water.
- Place the solution in a spray dispenser.
- Thoroughly douse surfaces that have heavy deposits of contaminants and allow to stand for 3 minutes.
- Wipe the contaminants from the surface with a paper towel.
- Discard the towel.
- Douse the surface again but use the bleach solution that is used for hand washing and wipe off the residual contamination with a paper towel.
- Discard the towel and allow surface to dry.

Important Considerations

- For greatest effectiveness, prepare bleach solutions fresh daily, preferably just prior to use.
- Allow all bleach solutions to stand for at least 30 minutes before using.
- Do not immerse electrical or battery-operated tools/equipment in bleach solutions; wipe the outside of these objects with a disposable rag soaked with the solution and allow it to dry.
- Use gloves and eye protection when cleaning clothes, tools/equipment, and surfaces. Use respirator protection (an N-95 respirator is recommended) when mold is present.

- All containers should be labeled "Bleach-disinfected water: DO NOT DRINK."
- Caution: Never mix bleach with products containing ammonia.

Exposures

Heat Stress Related Illness

Personnel going from cool to hot climates will need to acclimate to the warmer environment – and as such they may be more susceptible to heat related illness and should be aware they will need to acclimate first.

Personnel exposed to extreme heat or work in hot environments may be at risk of heat stress.

- Exposure to extreme heat can result in occupational illnesses and injuries.
- Heat stress can result in heat stroke, heat exhaustion, heat cramps, or heat rashes.
- Heat can increase the risk of worker injuries as it may cause in sweaty palms, fogged-up safety glasses, and dizziness.
- Personnel at greater risk of heat stress include:
    - Those who are 65 years of age or older; are overweight; have heart disease or high blood pressure; or take medications that may be affected by extreme heat.
- Consult with the site safety and health officer to determine work/rest recommendations

Heat Stroke

Heat stroke is the most serious heat-related illness. It occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. When heat stroke occurs, the body temperature can rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not given.

Symptoms - Fatal if treatment is delayed

Confusion, altered mental status, slurred speech	Seizures
Loss of consciousness (coma)	Very high body temperature
Hot, dry skin or profuse sweating	

First Aid - Take the following steps to treat someone with heat stroke:

- Call 911 for emergency medical care.
- Stay with worker until emergency medical services arrive.
- Move the worker to a shaded, cool area and remove outer clothing.
- Cool the worker quickly with a cold water or ice bath, if possible; wet the skin, place cold wet cloths on skin, or soak clothing with cool water.
- Circulate the air around the worker to speed cooling.
- Place cold wet cloths or ice on head, neck, armpits, and groin; or soak clothing w/cool water.

Heat Exhaustion

Heat exhaustion is the body's response to an ***excessive loss of the water and salt***, usually through excessive sweating. People most prone to heat exhaustion are those that are elderly, have high blood pressure, and those working in a hot environment.

Symptoms

Headache	Weakness	Confusion	Elevated body temperature
Nausea	Irritability	Vomiting	Decreased urine output
Dizziness	Thirst	Heavy sweating	

First Aid - Take the following steps to treat someone suffering from heat exhaustion:

- Take worker to the clinic or emergency room for medical evaluation and treatment.
- If on site or local medical care is unavailable, call 911.
- Stay with worker until help arrives.
- Remove worker from hot area and give liquids to drink.
- Remove unnecessary clothing, including shoes and socks.
- Use cold compresses to cool the worker; or cool head, face, & neck with cold water.
- Encourage frequent sips of cool water.

Rhabdomyolysis

Rhabdomyolysis is a medical condition associated with heat stress and prolonged physical exertion, resulting in the rapid breakdown, rupture, and death of muscle.

Symptoms

Muscle cramps/pain	Exercise intolerance
Abnormally dark (tea or cola colored) urine	Asymptomatic
Weakness	

First Aid: Take the following steps to treat someone with symptoms of rhabdomyolysis:

- Stop activity
- Increase oral hydration (water preferred).
- Seek immediate care at the nearest medical facility.
- Ask to be checked for rhabdomyolysis (i.e., blood sample analyzed for creatine kinase).

Fainting

Heat fainting (i.e., heat syncope) is an episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization.

Symptoms

Fainting (short duration)	Light-headedness (prolonged standing; suddenly rising from a sitting or lying position)
Dizziness	

First Aid: Take the following steps to treat a worker with symptoms from fainting:

- Sit or lie down in a cool place.
- Slowly drink water, clear juice, or a sports drink.

Heat Cramps

Heat cramps usually affect personnel who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion.

Symptoms

Muscle cramps, pain, or spasms in the abdomen, arms, or legs

First Aid: Personnel with heat cramps should:

- Drink water & have a snack and/or carbohydrate-electrolyte replacement liquid (e.g., sports drinks) every 15 - 20 minutes.
- Avoid salt tablets.
- Get medical help if the worker has heart problems, is on a low sodium diet, or if cramps do not subside within 1 hour.

Safe work practices - Heat stress control measures

Hydration

- People should drink an appropriate amount to stay hydrated.
- If in the heat ***<2 hours*** and involved in moderate work activities, drink 1 cup (8 oz.) of water every 15–20 minutes.
- During prolonged sweating lasting several hours, drink sports drinks containing balanced electrolytes.
- Avoid alcohol and drinks with high caffeine or sugar.
- Generally, fluid intake should not exceed 6 cups per hour.

Rest Breaks

- Personnel should take appropriate rest breaks to cool down and hydrate.
- Rest and take water breaks when you feel heat discomfort.
- Modify work/rest periods to give the body a chance to get rid of excess heat.
- Shorten work periods and increase rest periods:
  - As temperature, humidity, and sunshine increase.
  - When there is no air movement.
  - If protective clothing or equipment is worn.
  - For heavier work.

Cold Stress

Personnel who are exposed to extreme cold or work in cold environments may be at risk of cold stress. Extreme cold weather is a dangerous situation that can bring on health emergencies in susceptible people, such as:

- People without shelter, outdoor personnel, and those who work in an area that is poorly insulated or without heat.
- Cold stress and its effects can vary across different areas of the country.
- In regions unaccustomed to winter weather, near freezing temperatures are considered factors for cold stress.
- Whenever temperatures drop decidedly below normal and as wind speed increases, heat can more rapidly leave your body. These weather-related conditions may lead to serious health problems.

Hypothermia

When exposed to cold temperatures, your body begins to lose heat faster than it can be produced.

- Prolonged exposure to cold will eventually use up your body's stored energy. The result is hypothermia, or abnormally low body temperature.
- Body temperature that's too low affects the brain, making the victim unable to think clearly or move well. This makes hypothermia dangerous because a person may not know it's happening and will not be able to do anything about it.

Symptoms

Hypothermia symptoms can vary depending on how long someone has been exposed to cold temperatures.

Early Symptoms

Shivering	Loss of coordination
Fatigue	Confusion and disorientation

Late Symptoms

No shivering	Dilated pupils	Loss of consciousness
Blue skin	Slowed pulse and breathing	

First Aid: Take the following steps to treat a worker with hypothermia:

- Alert the supervisor and request medical assistance.
- Move the victim into a warm room or shelter.
- Remove wet clothing.
- Warm the center of their body first-chest, neck, head, and groin-using an electric blanket, if available; or use skin-to-skin contact under loose, dry layers of blankets, clothing, towels, or sheets.
- Warm beverages may help increase the body temperature, but do not give alcoholic beverages. Do not try to give beverages to an unconscious person.
- After body temperature has increased, keep the victim dry and wrapped in a warm blanket, including the head and neck.
- If victim has no pulse, begin cardiopulmonary resuscitation (CPR).

Frostbite

Frostbite is an injury to the body that is caused by freezing. Frostbite causes a loss of feeling and color in the affected areas. It most often affects the nose, ears, cheeks, chin, fingers, or toes. Frostbite can permanently damage body tissues, and severe cases can lead to amputation. In extremely cold temperatures, the risk of frostbite is increased in personnel with reduced blood circulation and among personnel who are not dressed properly.

Symptoms

Reduced blood flow to hands and feet (fingers or toes can freeze)	Numbness	Tingling or stinging
Bluish or pail, waxy skin	Aching	

First Aid: Personnel suffering from frostbite should:

- Get into a warm room as soon as possible.
- Unless absolutely necessary, do not walk on frostbitten feet or toes – this increases the damage.
- Immerse the affected area in warm water (temp should be comfortable to the touch for unaffected parts of the body).
- Warm the affected area using body heat; for example, the heat of an armpit can be used to warm frostbitten fingers.
- Do not rub or massage the frostbitten area; doing so may cause more damage.
- Do not use a heating pad, heat lamp, or the heat of a stove, fireplace, or radiator for warming. Affected areas are numb and can be easily burned.

Chilblains

Chilblains are caused by the repeated exposure of skin to temperatures just above freezing to as high as 60 degrees F. The cold exposure causes damage to the capillary beds (groups of small blood vessels) in the skin. This damage is permanent and the redness and itching will return with additional exposure. The redness and itching typically occurs on cheeks, ears, fingers, and toes.

Symptoms

Redness	Possible blistering
Itching	Possible ulceration in severe cases
Inflammation	

First Aid: Personnel suffering from chilblains should:

- Avoid scratching
- Slowly warm the skin
- Use corticosteroid creams to relieve itching and swelling

- Keep blisters and ulcers clean and covered

Animals, Plants, and Pests – Exposure Risks

Ticks

Tick-borne illnesses (e.g., *Rocky Mountain Spotted Fever*) are transmitted to people by bacteria from bites of infected deer (blacklegged) ticks.

- Lyme disease.
  - Most, but not all, victims will develop a "*bulls-eye*" rash.
  - Other signs and symptoms may be non-specific and similar to flu-like symptoms such as fever, lymph node swelling, neck stiffness, generalized fatigue, headaches, migrating joint aches, or muscle aches.
  - You are at increased risk if your work outdoors involves construction, landscaping, forestry, brush clearing, land surveying, farming, railroads, oil fields, utility lines, or park and wildlife management.

Protective measures

- Wear light-colored clothes to see ticks more easily.
- Wear long sleeves; tuck pant legs into socks or boots.
- Wear high boots or closed shoes that cover your feet completely.
- Wear a hat.
- Use tick repellants, but not on your face.
- Shower after work. Wash and dry your work clothes at high temperature.
- Examine your body for ticks after work. Remove any attached ticks promptly and carefully with fine-tipped tweezers by gripping the tick. Do not use petroleum jelly, a hot match, or nail polish to remove the tick.

Mosquitoes

West Nile virus is transmitted by the bite of an infected mosquito.

Mild symptoms

Fever	Occasionally with a skin rash on the trunk of the body
Headache	Occasionally swollen lymph glands
Body aches	

Severe symptoms

Headache	Stupor	Tremors
High fever	Disorientation	Convulsions
Neck stiffness	Coma	Muscle weakness and/or paralysis

Zika virus is spread mostly by the bite of an infected Aedes species mosquito (Ae. aegypti and Ae. albopictus). These mosquitoes bite during the day and night.

- Zika can be passed from a pregnant woman to her fetus. Infection during pregnancy can cause certain birth defects.
- There is **no** vaccine or medicine for Zika.
- Local mosquito-borne Zika virus transmission has been reported in the continental United States.

Symptoms

Fever	Headache	Conjunctivitis (red eyes)
Rash	Joint pain	Muscle pain

Protective measures

- Apply *Picaridin* or insect repellent with DEET to exposed skin.
- Spray clothing with repellents containing DEET or permethrin.
  Note: Do not spray permethrin directly onto exposed skin.
- Wear long sleeves, long pants, and socks.
- Be extra vigilant at dusk and dawn when mosquitoes are most active.
- Get rid of sources of standing water (used tires, buckets) to reduce or eliminate mosquito breeding areas.

Treatment

- There is no specific medicine or vaccine for Zika virus.
  - Treat the symptoms.
  - Get plenty of rest.
  - Drink fluids to prevent dehydration.

- Take medicine such as acetaminophen (Tylenol®) to reduce fever and pain. Do not take aspirin and other non-steroidal anti-inflammatory drugs (NSAIDS) until dengue can be ruled out to reduce the risk of bleeding.
- If you are taking medicine for another medical condition, talk to your healthcare provider before taking additional medication.

Poisonous Plants

- ***Poison ivy***, ***poison oak*** and ***poison sumac*** have poisonous sap (urushiol) in their roots, stems, leaves and fruits. The urushiol may be deposited on the skin by direct contact with the plant or by contact with contaminated objects, such as clothing, shoes, tools, and animals.
- Approximately 85 percent of the general population will develop an allergy if exposed to poison ivy, oak or sumac.
- Forestry personnel and firefighters who battle forest fires have developed rashes or lung irritations from inhaling the smoke of burning plants.

Protective measures

- Wear long-sleeved shirts and long pants, tucked into boots.
- Wear cloth or leather gloves.
- Apply barrier creams to exposed skin.
- Know how to identify poison ivy, oak, and sumac plants.
- Know the signs and symptoms of contact with poisonous ivy, oak, and sumac.
- Keep rubbing alcohol accessible. It removes the oily resin up to 30 minutes after exposure.

Rodents, Snakes, and Insects

Rodents and Wild or Stray Animals

- Dead and live animals can spread diseases such as Rat Bite Fever and Rabies.
- Avoid contact with wild or stray animals.
- Avoid contact with rats or rat-contaminated buildings. If you can't avoid contact, wear protective gloves and wash your hands regularly.
- Get rid of dead animals as soon as possible.
- If bitten/scratched, get medical attention immediately.

Protective measures

- Wear long pants, socks, and long-sleeved shirts.
- Use insect repellents that contain DEET or Picaridin.
- Treat bites and stings with over-the-counter products that relieve pain and prevent infection.
- Avoid fire ants; their bites are painful and cause blisters.
    - Severe reactions to fire ant bites (chest pain, nausea, sweating, loss of breath, serious swelling or slurred speech) require immediate medical treatment.

Snakes

- A snake's striking distance is about 1/2 the total length of the snake.

Protective measures

- Watch your hand and feet placement when removing debris. If possible, don't place fingers under debris you are moving.
- If you see a snake, step back and allow it to proceed.
- Wear heavy gloves.
- Wear boots ***at least 10 inches high***.
- Watch for snakes sunning on fallen trees, limbs or other debris.
- If bitten, note the color and shape of the snake's head to help with treatment.
    - Keep bite victims still and calm to slow the spread of venom in case the snake is poisonous. Seek medical attention as soon as possible.
    - Do not cut the wound or attempt to suck out the venom.
    - **Apply first aid**: lay the person down so that the bite is below the level of the heart, and cover the bite with a clean, dry dressing.

Displaced Domestic Animals –Guidance on Health & Safety

The National Institute for Occupational Safety and Health (NIOSH) provides the following interim guidelines for preventing injury and illness among personnel performing ***animal rescue and recovery*** efforts in the response to hurricanes. These materials were developed by NIOSH for hurricanes Katrina and Rita but may be applicable for other hurricane responses. This guidance is based on best available information as of October 14, 2005 and will be updated as additional information is available.

- Only personnel with proper training in animal restraint, handling, and care should work directly with displaced animals.
- Employers, response leaders, and volunteer coordinators should ensure only trained, properly equipped personnel are assigned to tasks involving direct animal handling and care.
- Evacuations due to natural disasters and other emergencies may result in a large number of displaced domestic animals. Animals may be abandoned in residences, facilities, or outdoors.
- Many disaster shelters cannot accept pets because of state health and safety regulations.
- Displaced animals may be without food, water, supervision, and medical care for days or even weeks.
- Fear, panic, separation anxiety, and other behavioral disorders are common in displaced animals. They may exhibit unpredictable or aggressive behavior.

Displaced domestic animals may present a number of safety and health hazards to emergency response and animal rescue personnel.

- Personnel at greatest risk include emergency personnel (firefighters, police, and military personnel) and animal rescue personnel including animal handlers, animal shelter personnel, veterinarians, and veterinary technicians and assistants. However, all personnel involved in the evacuation process and early clean-up and remediation efforts are at risk.

Animal bites and scratches

- Animal bites and scratches can result in significant worker injury. Serious bite wounds may require surgical repair.
- Secondary infections are a significant hazard from bite wounds; they can result in serious joint or systemic infection. Even minor skin damage can result in infections and illnesses.
- Scratches and injuries from contaminated equipment are also of concern. Bites from dogs, cats, ferrets, and other mammals may present a risk for rabies.
- *Rabies* and Other Zoonoses. *Zoonoses* are infectious diseases that are transmitted from animals to humans.
    - Rabies is the primary zoonosis of concern. It is a potentially fatal viral disease.
    - It is contained in saliva and most often transmitted by the bite of an infected mammal.
    - It is preventable by vaccination. Domestic animals may transmit other zoonoses to personnel.
    - Animal feces, and contaminated skin, fur, surfaces, and cages present a risk of infection.
- Dogs and especially cats may pose a risk for *ringworm* which is a skin infection caused by a fungus.
- Cat feces pose a risk of transmission of toxoplasmosis, a parasitic infection.
- Some pet rodents (such as hamsters, gerbils, and guinea pigs) can transmit lymphocytic choriomeningitis virus (LCMV). LCMV may be transmitted from exposure to urine, droppings, saliva, or nesting material of infected rodents.
- Toxoplasma and LCMV may cause birth defects in an unborn child if a pregnant woman becomes infected.

Protective measures

- Complete the rabies pre-exposure vaccination series before directly handling dogs, cats, ferrets, or other mammals that may be infected with rabies.
- Thoroughly clean all bite wounds and scratches with soap and water.
- Immediately get medical evaluation of any bite wound and the need for possible rabies post-exposure treatment/vaccination.
- Wash hands frequently with soap and water:
    - Before and after handling animals.
    - After coming into contact with animal saliva, urine, feces, or blood.
    - After cleaning cages or equipment.
    - Before eating, drinking, smoking, taking breaks, or leaving work.
- Use alcohol-based hand sanitizers for cleaning hands when soap and water are not available.
- Change into clean clothing before leaving the workplace.
- Consult with a healthcare provider about any occupational injury or illness.

Personal Protective Clothing and Equipment

- Wear disposable outerwear or clothing that can be removed before leaving the workplace if clean clothing or laundry facilities are not available.
- Wear medical examination gloves that provide a protective skin barrier when handling animals, animal waste, cages, equipment, and pesticides.
- Wear two pairs of gloves if one pair alone might tear.

- Make sure latex gloves are reduced-protein, powder-free gloves to reduce exposure to allergy-causing proteins.
  - Use non-latex gloves if you need or want to avoid latex.
- Wear cotton or leather work gloves as the outer pair when heavy work gloves are needed.
  - Remember that cotton, leather, and other absorbent gloves are not protective when worn alone.
- Wear protective eyewear (safety glasses w/side shields) or face shields if there is a risk of spitting or splashing of contaminated material.
- Wear sturdy clothing and protective footwear with non-slip soles; tennis shoes or sneakers do not provide protection from bite, puncture or crushing injuries.
- Wear hearing protection if you must raise your voice to talk to someone an arm's length away (for example, when working in enclosed spaces with barking dogs).

Animal handling risks

- Animal rescue and handling involve tasks that require ***lifting*** and ***moving heavy, awkward loads***. Personnel may lift large animals, and supplies and equipment such as carriers, kennels, cages, food, and bedding material. Heavy lifting may result in sprains, strains, tears, and other lifting injuries.
- Dermatologic Conditions
  - Frequent hand washing, bathing of animals, or exposure to substances on animals' fur may result in a variety of dermatologic rashes, lesions, and other conditions.
- Animal Allergens
  - Exposure to animals or animal products can cause asthma and allergies. Animals or animal products such as dander, hair, scales, fur, saliva, and body wastes contain allergens that can cause both respiratory and skin disorders.

Protective measures

- Use proper lifting techniques
- Reduce the weight of loads when possible
- Work together to lift loads that are unsafe for one person to handle
- Pregnant/immunocompromised personnel should avoid contact with cat feces & pet rodents to reduce risk of zoonotic disease.

Animal injury and illness reporting

Immediately report to the supervisor:

- Any bite or scratch injury.
- Any needlestick or other sharps-related injury.
- Any symptom(s) of infectious disease or zoonosis.
- Any other workplace injury or illness.

Traumatic Stress

- Emergency personnel must respond quickly to natural disasters, such as earthquakes or hurricanes, and to manmade disasters, such as technological failures or terrorist attacks.
- Personnel are at risk of experiencing stress from a *traumatic incident*. A traumatic incident is one that may involve exposure to catastrophic events, severely injured children or adults, dead bodies or body parts, or a loss of colleagues.
- NIOSH recommends that all personnel involved in response activities help themselves and their co-workers and reduce the risk of experiencing stress associated with a traumatic incident by utilizing simple methods to recognize, monitor, and maintain health on-site and following such experiences.

Stress

Personnel may experience physical, cognitive, emotional, or behavioral symptoms of stress. Some people experience these reactions immediately at the scene, while for others symptoms may occur weeks or months later.

Physical symptoms. Personnel experiencing any of the following symptoms should seek IMMEDIATE medical attention

Chest pain	Severe pain
Difficulty breathing	Symptoms of shock (shallow breathing, rapid or weak pulse, nausea, shivering, pale and moist skin, mental confusion, and dilated pupils)

Additional physical symptoms. If these symptoms occur over time or become severe, personnel should seek medical attention.

Fatigue	Profuse sweating	Visual difficulties
Nausea/vomiting	Thirst	Clenching of jaw
Dizziness	Headaches	Nonspecific aches and pains

Cognitive symptoms

If these symptoms occur on the scene personnel may not be able to stay clearly focused to maintain their own safety or to rescue injured victims. Personnel may experience momentary cognitive symptoms; however, if symptoms are chronic or interfere with daily activities, personnel should seek medical attention.

Cognitive symptoms

Confusion	Poor concentration	Difficulty identifying familiar objects or people
Disorientation	Poor problem solving	Nightmares
Heightened or lowered alertness	Memory problems	

Emotional symptoms

Strong emotions are ordinary reactions to a traumatic or extraordinary situation. Personnel should seek mental health support from a disaster mental health professional if symptoms or distress continue for several weeks or if they interfere with daily activities.

Emotional symptoms

Anxiety	Fear	Loss of emotional control
Guilt	Irritability	Feeling overwhelmed
Grief	Depression	Blaming others or self
Denial	Sense of failure	Severe panic (rare)

Behavioral symptoms

Intense anger	Excessive alcohol consumption	Temporary loss or increase of appetite
Withdrawal	Inability to rest, pacing	Change in sexual functioning
Emotional outburst		

Recommendations to Monitor and Maintain Health On-Site

- Personnel need to take care of their own health to maintain the constant vigilance they need for their own safety.
- Personnel must be able to stay focused on the job in the dynamic, changing emergency environment.
- Often personnel do not recognize the need to take care of themselves and to monitor their own emotional and physical health. This is especially true if recovery efforts stretch into several weeks.

The following guidelines contain simple methods for personnel and their team leaders to help themselves and their team members. These guidelines should be read while at the site and again after personnel return home.

- Control the organization and pace of the rescue and recovery efforts
- Pace yourself. Rescue and recovery efforts at the site may continue for days or weeks.
- Watch out for each other. People may be intently focused on a particular task and may not notice a hazard nearby or behind.
- Be conscious of those around you. Personnel who are exhausted, stressed, or even temporarily distracted may place themselves and others at risk.
- Take frequent rest breaks. Rescue and recovery operations take place in extremely dangerous work environments. Mental fatigue, particularly over long shifts, can greatly increase emergency personnel' risk of injury.
- Maintain adequate nutrition and rest
- Eat and sleep regularly. Maintain as normal a schedule as possible and adhere to the team schedule and rotation.
- 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.
- Monitor mental/emotional health
- Recognize 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 provided 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.

Recommendations to Maintain Health Following the Incident

Over time, personnel' impressions & understanding of their experience will change. No matter what the event or an individual's reaction to it, personnel can follow basic steps to help themselves adjust to the experience:

- 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.
- 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 okay 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.

Traffic Safety

- Watch for non-operating traffic control signals.
- Landmarks and street signs may be missing, so know where you are going before you go there.
- Water puddles may hide hazards; it takes very little water to cause hydroplaning and loss of control.
- Be prepared for extended delays.
- Watch for other drivers
- Flaggers may be hidden or obstructed by larger vehicles

Hazards

- Traffic congestion
- Downed power lines
- Multiple entrances/exits to roadway
- 2-way traffic
- No signage to indicate entering a work zone
- Limited visibility for traffic
- Worker with multiple tasks – flagging & truck loading

Traffic Signs

- Construction areas shall be posted with legible traffic signs at points of hazard.
- All traffic control signs or devices used for protection of construction workmen shall conform to American National Standards Institute D6.1-1971, Manual on Uniform Traffic Control Devices for Streets and Highways.

Flagmen (persons)

- Used when signs, signals, and barricades do not provide adequate protection to the worker
- Signaling directions must conform to ANSI D6.1-1971
- Flagman must wear High visibility garments.
  - While such garments may make a worker more conspicuous to approaching drivers, they do not offer any actual protection from traffic. Such garments must be used in conjunction with other traffic safety means.

Signs, Signals, and Barricades

Accident Prevention Signs and Tags

- Before work begins in the vicinity of vehicular or pedestrian traffic that may endanger employees, ensure that…
  - Warning signs and/or flags or other traffic control devices are placed conspicuously to alert and channel approaching traffic. Where further protection is needed, barriers shall be utilized. At night, warning lights shall be prominently displayed, and excavated areas shall be enclosed with protective barricades.
  - Any employee finding any crossed or fallen electrical wires, which create or may create a hazardous situation at the work area, remains on guard or adopts other adequate means to warn other employees of the danger. Notify proper authority at the earliest practical moment.
- Signs and symbols shall be visible at all times when work is being performed, and shall be removed or covered promptly when the hazards no longer exist.
- If work exposes energized or moving parts that are normally protected, danger signs shall be displayed and barricades erected, as necessary, to warn other personnel in the area.

Search and Rescue Operations

Following a catastrophe, rescue personnel and emergency personnel are the first to arrive on the scene, often in unfamiliar surroundings and adverse weather conditions, ready to save lives and secure the environment to help protect the lives of those to follow. Rescue personnel and emergency personnel may be involved in emergency medical operations involving victim rescue or body recovery around piles of rubble and other debris, collapsed structures or near structural steel.

Potential Hazards for Rescue and Emergency Personnel

- Exposure to blood or body fluids, or pathogens from sewer system breaks.
- Damaged utility services, including downed electrical cables, overhead power lines, broken gas lines, steam and water mains, or compressed gas cylinders.
- Piles of construction and other types of debris, including over-hanging debris.
- Airborne smoke and dust (asbestos, crystalline silica, etc.) and possible eye and skin injuries from dust and flying debris.
- Confined spaces (limited openings from entry or exits), possible hazardous atmospheres, including possible flammable or toxic environments.
- Slips, trips or fall hazards from holes, protruding rebar, etc.
- Dangers due to proximity to heavy machinery, e.g., cranes, loaders, debris-hauling trucks, etc.
- Handling a variety of sharp, jagged materials.
- Potential for secondary collapse of unstable structures.
- Excessive noise from rescue/ventilation or other heavy equipment, including generators

Safety Precautions

PPE

- **Hand Protection**. When handling potentially infectious materials, use appropriate barrier protection including latex and nitrile gloves (powder-free latex gloves with reduced latex protein content can help avoid reaction to latex allergies). These gloves can be worn under heavy-duty gloves which will, in turn, protect the wearer from cuts, puncture wounds, or other injuries that break the skin (caused by sharp environmental debris or bone fragments). A combination of a cut-proof inner layer glove and a latex or similar outer layer is preferable.
- **Foot Protection**. Footwear should similarly protect against sharp debris.
- **Respiratory Protection**. Use respiratory protection to combat effects from breathing dust and hazardous atmospheres which might contain some, or all, of the following: Freon, carbon monoxide, hydrogen sulfide, asbestos, carbon dioxide, ammonia, and welding gases.
- **Hearing Protection**. Hearing protection is extremely important, particularly around saws, earth-moving equipment and hydraulic tools.
- **Eye Protection**. Protective eyewear (safety glasses with side shields, at a minimum), is necessary personal protective equipment.
- **Fall Protection Equipment**. Use fall protection equipment, with lifelines tied off to suitable anchorage points (e.g., bucket trucks), whenever possible.

Safe work practices

- Monitor for signs of heat/cold stress, such as altered vital signs, confusion, excessive sweating, and fatigue. Adjust work schedules, rotate personnel, and add additional personnel to work teams. Refrain from food and beverages in areas exposed to toxic materials.
- Use an N-95 or greater respiratory protection for most activities with dust exposure, including silica and cement dust. Use full face respirators with P-100 organic vapor/acid gas combination cartridges if airborne contaminants are causing eye irritation.
- Emergency personnel should wear high-visibility and/or retro-reflective garments or vests to assure that they are readily identifiable by other rescue and support personnel.
- Watch for heavy equipment operation, including the swing radius for cranes and other equipment with arms. Each piece of heavy equipment should have a spotter when operating near emergency personnel and skilled support personnel.
- Be aware of electrical and gas hazards, e.g., downed wires and cables or broken gas lines. Incident commanders should be notified before continuing.
- If working in confined spaces, ensure that at least one person remains outside the space to monitor operations and assist in an evacuation, if necessary. Reliable communications and rescue equipment, along with functioning alarm systems, are imperative
- Decontamination of personnel and equipment before leaving the site is important to prevent adverse health effects, contain any hazards to the site, and prevent secondary contamination of off-site facilities (e.g., fire stations or worker's homes) or additional equipment (e.g., ambulances).