

Health and Safety In Emergency Response

A Special Insert By

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Introduction

An emergency is defined as a serious situation or occurrence that happens unexpectedly and demands immediate action. Any time conservators prepare to respond to an emergency involving cultural property, they will want to remind themselves that they are never first responders. Not all stages of an emergency demand rapid response. For cultural properties, conservators will only be allowed access once an area has been cleared of dangers that are immediately threatening to life and health. Precautions taken by the conservator while preparing for and performing emergency response measures for cultural property will protect the individuals involved, allow the project to run smoothly, and will also benefit everyday practice.

In every emergency instance, conservators and other custodians of cultural property will need to minimize personal risks and consider their own level of preparedness before agreeing to participate in a response.

Before You Sign On

Careful and considered personal assessment and preparations on your part will help ensure that your response efforts are successful.

About You

- Assess your own ability to respond—your general health, physical stamina, and emotional strength. Remember that common health conditions like high blood pressure may make you ineligible to wear certain protective devices. If in doubt, consult with your physician or with health and safety staff at your own institution.
- Consider what arrangements would need to be made for life at home to function in your absence (responsibilities for children, ill or aging relatives, pets). Check that your health and legal directives are current.
- Check that your immunizations (Tetanus, Hepatitis A, Hepatitis B) and medical evaluation are up-to-date. Check www.cdc.gov for additional information.
- Keep your annual respirator fit testing up to date.
- Involvement in community emergency response training (CERT) is an excellent means of acquiring a fundamental

understanding of an emergency response system focused on people. CERT covers basic first aid and incident command structure.

- Contemplate whether you can work patiently and with sensitivity in an unpredictable setting relying on individuals under great stress who may have difficulty succinctly conveying essential information.
- Evaluate the contributions you could make in light of your training, experience, and skill set; know what role is expected of you.

About the Site

- Is the staff at the site ready for you?
- Is the location accessible? Have roads been closed?
- What kind of arrangements can be made for transportation and lodging?
- Does the site have electrical power?
- Will the equipment you need be available? Can you make all equipment compatible?
- Can food, gas, and other supplies be acquired locally?
- Is there clean water, and is it safe to drink?
- Are restrooms and shower facilities in working order?
- Can provisions be made for disposal of debris? Might it pose health hazards, security problems, create access issues, harbor animals or insects?
- Can you and your vehicle obtain appropriate identification to allow passage to areas that may be restricted? Have curfews been set and can you accomplish your work within a limited time span? Are repair facilities and vehicle fuel available?

Before You Leave for the Site

Though it may seem counterintuitive, slow down when responding to cultural property emergencies. The conservator's goal is not to rush in and rescue, depleting energy and making ill-informed decisions. By first gaining information about custodial priorities and concerns, conservation personnel will be able to make reasoned and informed choices about how a response may best proceed.

- Request information about an institution's collections and

Table 1. Supplies

(Non-conservation supplies for a variety of disaster response scenarios)

Basic supplies

- Flashlight and batteries
- Pencils and note pads
- Radio with AM/FM/TV and weather bands (hand crank recommended)
- Extension cord and multiple outlet adapters
- Portable GFCI outlet
- Device to test for presence of AC power
- Photographer's vest with multiple pockets
- Emergency water filtration/purification
- Compass
- Pocket knife and/or Leatherman™ tool
- Sunscreen (high SPF)
- Insect repellent (DEET based)
- First aid kit (including antibacterial ointment)
- Emergency blanket
- Hat
- Sunglasses
- Light rope/string
- Duct tape
- Wet weather gear
- Fanny pack
- Garbage bags and re-sealable plastic bags
- Mess kit (knife, fork, spoon, cup, dish)
- Copy of driver's license, insurance information

Personal supplies

- Cash (sufficient for food purchase for a week)
- Medications (in original containers)
- Toiletries (soap, shampoo, deodorant, toothbrush, toothpaste)
- Toilet paper
- Waterless hand cleaner
- Razor for men (shave for respirator use)
- Towel and washcloth

Electronic equipment

- Cellular telephone and charger
- Multiple channel walkie-talkie
- Digital camera, extra batteries and memory cards, converters, cables, charger
- Extra batteries and charger
- Video camera, extra tapes, cables, batteries and charger
- Laptop computer
- Backup drive (buss powered)
- Keychain drive, jump drive, thumb drive
- If power is unreliable: AC inverter for powering equipment from auxiliary power (auto cigarette lighter) with (to allow more than one device to be powered at once) jump-start power device

Health and safety supplies

- Gloves (thin nitrile and leather work gloves)
- Respirator (fit tested half-mask or full face with cartridges for particulates and organics/particulates)
- Extra ffp's ("filtering face piece" or disposable respirator) to share with people who don't have any respiratory protection (see: www.osha.gov/pls/oshaweb/owadisp.show_document)
- Unvented safety goggles that fit while wearing respirator
- Boots (waterproof, steel toe, and steel shank)
- Hardhat
- Extra clothing, and/or disposable clothing
- Jacket and/or weather appropriate clothing
- If you expect to be in an area where the infrastructure has not been restored or services are limited, be prepared to provide accommodations, food, water.

Camping supplies

- Tent
- Sleeping bag
- Sleeping pad
- Backpack stove (fuel cannot be transported by air)
- Appropriate clothing
- Food
- Water filtering device and/or sufficient water supply
- Backpack

Resources

U.S. Centers for Disease Control (CDC) *Disease and Injury prevention information including current recommendations for immunizations.* www.cdc.gov

National Institute for Occupational Health and Safety (NIOSH) *information specific to Emergency Preparedness and response, as well as general information on chemicals, hazards, and exposures.* www.cdc.gov/niosh/

Federal Emergency Management Agency (FEMA) www.fema.gov/

Canadian Center for Occupation Health and Safety (CCOHS) www.ccohs.ca

Conservation OnLine (Cool) *Disaster Preparedness and Response*
<http://palimpsest.stanford.edu/bytopic/disasters>

Heritage Preservation *links to "Tips for Working with Emergency Responders," "Guide to Navigating FEMA and SBA Disaster Aid for Cultural Institutions," and "Recommended Professional Emergency Management Training"* www.heritagepreservation.org

facilities. In order to gain a thorough understanding of potential risks and challenges, ask to review:

- floor plans
 - emergency plans
 - chemical inventories
 - other relevant data
- Prepare materials you will want to take with you in response (Table 1).
 - Familiarize yourself with the operation of any equipment you may use.
 - Arrange for reliable means of communications (such as satellite phone).
 - Confirm who will be there to meet you; who will have keys.
 - Ascertain viable transportation routes.
 - Check Internet sources for potential new information about the site's vicinity.
 - Investigate Emergency Preparedness and Response Resources (see box above)

Upon Arrival

Your initial arrival at the disaster site is one of the most important times in the response effort. Keep in mind that significant steps to ready the site for your arrival have already occurred, such as actions by public authorities, collection custodians, or other conservators. Approach with humility and sensitivity as well as with confidence that you can make a contribution to the team effort.

At the Site

All safety precautions that would apply during normal conservation practice apply, including job hazard analysis, the use of appropriate tools, equipment, and PPE as well as the ability to evaluate the situation as it unfolds. The last thing that you want to do in an emergency response is to become a casualty. Wearing yourself out will not help you, your teammates, or the collections being addressed.

Know your own limits.

- Do not sacrifice your physical and emotional well being to the event
- Conserve your energy by setting task priorities and pacing the work
- Take frequent breaks **before** fatigue sets in
- Drink plenty of non-carbonated, non-caffeinated fluids (e.g., water) every 15–20 minutes so that you imbibe at least 60 ounces per day
- Eat regular meals
- Sleep consistently for as long as needed

Make effective communication a priority.

- Always work and be with a "buddy"
- Never venture out of your colleague's hearing or visual range
- Be sure that others know your whereabouts at all times
- Adhere to a schedule and rendezvous point

Adopt good personal hygiene practices, critical to disease prevention.

- Even if gloves are worn, wash hands frequently after removing gloves
- Use pre-packaged wipes or waterless sanitizer if the water supply is limited or questionable
- Keep work areas tidy to minimize tripping hazards and discourage new pest habitats

Avoiding Bodily Injuries

First Aid: Discern whether you can treat an injury yourself, or if you must call a health professional.

Immediately attend to even minor cuts and burns which in non-emergency settings might be deferred.

- Clean all open wounds and cuts with soap and clean water.
- If clean water and soap are not available, use an alcohol-based product.
 - Alcohol-based rubs are fast-acting and capable of significantly reducing germs on skin.
- Since any wound or rash has the potential to become infected, consult with a health care provider at the earliest opportunity.
- Tetanus is a risk from contaminated water or soil that enters cuts or open wounds.

Hot Environments: High temperatures and excessive clothing or protective gear can lead to fatigue, dizziness, cramps, fainting, heat rash, heat exhaustion, or heat stroke.

- Become familiar with the signs and symptoms of heat injuries. Remember that heat stroke should be treated as a serious medical emergency.
- Wear light-colored and loose-fitting clothing
- If possible, work during cooler hours of the day
- Use wrap-around sun glasses that provide 100% UV (A and B) eye protection
- Generously apply a minimum of broad spectrum (UVA and UVB rays) SPF 15 sunscreen to lips and skin
- If you are experiencing any of the signs of heat stress, seek help from

a health professional immediately

- Stay well hydrated (see above)
- Take frequent breaks

Cold Environments: Exposure can result in numbing of the hands and feet, chilblains (inflammation of extremities), frostbite, or hypothermia.

- Limit exposure times
- Take frequent rest breaks in a warm area
- Replace sweat-dampened or wet clothing
- If you are experiencing any of the signs of cold exposure, seek help from a health professional

Wet Environments: Hypothermia can occur when exposed in temperatures below 75°F (24°C). It is exacerbated by wet or poorly insulated clothing or remaining in the water for too long.

- Always test water depth with a wood or plastic pole before entering unknown wet areas
- Never wade into water more than 2 inches deep
- Explore each step with the pole as you move
- Note that the bottom may not be visible even in shallow water

Disaster Re-Entry Checklist

(Note: this questionnaire was modeled after one developed by Robert Herskovitz for AIC's Train the Trainer in Emergency Response, 2000)

1. Has everyone known/believed to have been inside the structure been accounted for?
 - Have all injuries and notification(s) been attended to?
2. Has permission been given by civil authorities to re-enter?
 - Fire department
 - Police department
 - Government inspection services:
 - Building Inspector for structural, plumbing, and electrical
 - Health department
 - Other: e.g., National Guard
3. Are Utilities safe to use? If indicated, have they been turned-off?
 - Electricity
 - Lighting available?
 - Check for shorts and fires
 - Gas
 - Potential for leaks and explosion?
 - Water
 - For fire suppression
 - Domestic supply
 - Storm sewers
 - Steam
 - Burn & explosion hazard?
4. Do you understand your objective?
 - This is not a salvage or recovery mission.
 - This is initial assessment only.
 - Identify specific locations, types and extent of damage
5. Are you equipped with appropriate protective equipment?
6. Do you have a buddy to go with you? (Never enter or work alone).
7. Do you have communications established?
 - Is command center operational and informed about re-entry?
 - Equipment
 - Walkie-talkies
 - Cell phones
 - Does the equipment work inside the building?
 - Is there back-up equipment or alternatives?
8. Do you have means for quick initial documentation? (see table 1)

- Inspect the wet environment for:
 - A deep hole
 - Broken glass
 - Live snakes or animals
 - Other physical hazards
 - Collections items
- Wear appropriate protective equipment including
 - Puncture-resistant, water-tight rubber boots
 - A life jacket
- Take frequent breaks out of the water

Trench foot (also known as immersion foot) occurs when the feet are wet for long periods of time. Symptoms include a tingling and/or itching sensation, pain, swelling, cold and blotchy skin, numbness, and a prickly or heavy feeling in the foot.

- Take frequent breaks out of the water
- If possible, air dry and elevate your feet
- Exchange wet shoes and socks for dry ones as often as practical, but at least daily
- Treat affected parts with application of warm packs or warm water soaking (at 102–110°F) for 5 minutes
- Do not wear wet socks when resting or sleeping

Physical Stress: Physical injury may occur from repetitive motions, manual labor, or slips and falls. Individuals suffering from fatigue are more likely to be injured because they may be unaware of just how tired they are. Operating equipment or machinery without proper training or sufficient rest can injure people, collections, and historic structures.

- Never manually lift more than 50 lbs, or any weight that you sense is beyond your capability or comfort level. Caution, wet materials weigh more than expected
- Use proper automated-assisted lifting devices when practical
- Obtain appropriate training in advance of the event to safely operate any type of heavy equipment, including battery-powered lifts
- Do not operate or allow anyone else to operate anything more sophisticated than a hand pallet without adequate training

- Take frequent breaks and stretch your muscles before performing physical work
- Be sure that you are rested before engaging in any activity that requires special focus

Noise: Excessive noise caused by large or noisy equipment can cause permanent hearing loss. If voices need to be raised to be heard by colleagues in close proximity, hearing protection is needed.

- Wear earplugs or similar hearing protection
- Be especially alert to your surroundings since warning calls may not be heard
- Arrange in advance for a visual warning, (such as a red piece of paper) to gain a colleague's attention
- Avoid any sudden unanticipated movement as to not startle a colleague wearing hearing protection. This will help minimize additional damage inflicted on an object

Protecting Your Internal Organs

Particulates: Mold is a concern in buildings or on objects damaged by water. Mold growth will be a serious risk to those with allergies, asthma, and other respiratory ailments. Residual dried mud and sediment pose an inhalation risk when their dusts become airborne. Soot can be contaminated with any number of chemicals and may require special handling.

- For large remediation activities or those requiring special handling, seek assistance from experienced commercial services
- Always wear appropriate personal protective equipment.
 - Respirator (P100) HEPA (high efficiency particulate air) cartridges
 - Combination HEPA/organic cartridges may be used to minimize mold odor
 - Only individuals who have had appropriate medical evaluation, training, and fit testing may safely wear this equipment
 - Protect eyes with non-vented goggles
 - Cover entire hair area
 - Use duct tape to cover

clothing areas where particles might drift (e.g., zippers, cuffs)

- Aspirate debris from space and objects with HEPA vacuum suction
 - Bag will need to be emptied inside a glove bag, in the still-contaminated space, or outdoors
 - If a HEPA vacuum is not available, place the exhaust of a regular vacuum outside, away from air intake areas to prevent redistribution of particulates
 - If items are dry but power is unavailable, gently brush debris from items outside in the direction of the wind, away from the practitioner

Water Hazards: Water-borne diseases such as Hepatitis A and Hepatitis B, and those caused by organisms such as E.coli and vibrio species (cholera) may develop when sewage systems and drinking water supplies are disrupted during a disaster. Leptospirosis may infect those who wade into or handle water contaminated by animal urine. Flood waters can be contaminated with agricultural and industrial chemicals, human and animal waste, pesticides, solvents, arsenic, lead, and hexavalent chromium. Use only trusted sources of bottled water or tap water that has been confirmed as safe. Seek medical attention if you think that you have been exposed to something serious, are vomiting, or have a high fever or diarrhea accompanied by blood.

Always use appropriate PPE if wading into potentially contaminated waters.

Best practice for disinfecting drinking water:

- Rolling boil for 3–5 minutes will kill most bacteria, viruses, and parasites.
- First Need Deluxe Water Purifier™ (manufactured by General Ecology, Inc™)
 - Proprietary filter is effective against cysts, bacteria, and viruses
 - Non-chemical system with a charcoal filter to remove “aesthetic” contaminants

Other approaches:

- Treat with iodine tablets
 - Iodine will not kill parasites

- Do not use if allergic to iodine, shellfish, are pregnant, or have thyroid problems
- Add 1/8 teaspoon of 5.25% sodium hypochlorite (bleach) per gallon of water
 - Will not kill parasites
- Only distillation or reverse osmosis can remove salt from sea water or dissolved toxins from tainted water

Animal Hazards: The habitats for wild and domestic animals may be disturbed and they may take refuge in buildings or wander into other areas. Live, captive animals in zoos or museum research and display collections may escape. Insect and rodent populations may proliferate. Stray creatures, especially those that are ill or injured may be sources of a variety of zoonotic agents such as rabies. Note that snakes are a particular hazard in disasters that disturb their natural habitats, or where large quantities of water are present.

- Take extreme care in moving piles of debris.
- Use an exploratory wood or plastic probe before reaching into dimly lit spaces.
- Never approach stray animals.
- Report ill or injured animals to animal control experts.
- Immediately seek medical attention if bitten by any animal, tick, or if an insect bite appears to cause an abnormal reaction.
- For snake bites, it is important to report details about the type of snake when requesting medical attention.

Known Animal Waste-Related Conditions

Hantavirus Pulmonary Syndrome (HPS). This virus is carried in the animal saliva and excreta found in rodents. Humans contract the disease by inhaling contaminated particulates from the excreta. HPS is a serious condition that in some instances can be fatal.

- Wetting down suspected areas of contamination will help minimize airborne particles. Wetting collections is not advised
- Virus is susceptible to a 10% sodium hypochlorite solution (bleach) or hospital-grade disinfectants that meet the approval of the EPA in the US.
- If you believe that the collections

you are handling/treating have been infected with rodent droppings, make every effort to bring in portable exhaust ventilation equipment, and wear respiratory PPE. If it is not feasible to establish exhaust ventilation, respiratory protection should be implemented, using respirators equipped with 100-series (formerly known as HEPA) filters. The choice of respirator type will need to be evaluated based on the degree of contamination and the methods that will be used on the collections. For additional information see previous articles in the *AIC News* by D. Ertel (Sept. 2007), as well as D. Ertel and C. Colton (Sept. 2002)

- Contracting with a professional experienced in infection control procedures is recommended.

Histoplasmosis: This disease is caused by a fungus that forms in high organic content soil, contaminated with bird and bat droppings. It infects people and animals who inhale its airborne conidia. Histoplasmosis can be fatal.

- Wetting down suspected areas of contamination with water and a surfactant will help minimize airborne particles.
- Wear appropriate personal protection. According to NIOSH, the decision about what respirator to wear should be based on the degree of contamination and the degree of disturbance associated with the activity. NIOSH-approved particulate respirators are recommended if spores can be made airborne, with the 95-series respirators being the minimal selection.
- Contracting with a professional experienced in infection control procedures is recommended.

Known Insect-Related Conditions

Lyme Disease is a deer tick-borne bacterial infection that results when an infected tick bites a human.

- When using repellents, be sure to review the MSDS or label to determine the safest means of application. Some repellents should only be applied in the outdoors with natural ventilation.
- Repellents containing permethrin

may be sprayed on clothing and on non-facial exposed skin. Permethrin impregnated clothing is commercially available (withstands 70 washings).

- DEET (N,N-diethyl-methyl-met-atoluamide at a concentration of 20–30%) may be used on clothing and non-facial exposed skin. Lower concentrations will lower the length of time protected.
- Inspect yourself daily for ticks.
- If you find a tick that has been attached to you for more than 24 hours, wash the tick and skin with isopropyl alcohol and remove the tick with flat head tweezers. Seek medical attention to determine whether or not a regimen of antibiotics is required.

West Nile Virus is a mosquito-borne virus that normally cycles between mosquitoes and birds. It is transferred to humans by mosquito bites or in handling dead birds that have become infected by the virus. Most human infections (about 80%) cause no symptoms. In some cases the disease may manifest itself as West Nile Fever and may lead to encephalitis or meningitis.

- Minimize standing water to discourage mosquito populations. Where water persists, use a larvicide such as *Bacillus thuringiensis israelensis* (Bti). Bti is a naturally occurring soil bacterium that can effectively kill mosquito larvae present in water. Trade names include: Aquabac, Bactimos, Dipel, Teknar, and Vectobac.
- Wear a long sleeved shirt and long pants when outdoors.
- Spray exposed non-facial skin and clothing with permethrin or DEET to repel mosquitoes. (See http://edcp.org/factsheets/wnv_fact.html for further cautionary measures).
- Call upon professionals with experience and expertise in removing dead birds.

Known Plant Hazards

Dermatitis causing plants include poison ivy, western poison oak, and poison sumac; all urushiol producing plants. A rash is acquired by direct or indirect contact with urushiol, either by touching the plant, contaminated clothing, or

even an animal that has brushed against the plant.

- Be able to recognize plants that can cause skin reactions
- Protect skin from direct contact.
- Wash skin immediately with soap and water using a nail brush to reach under fingernails.
- Discard or wash clothing separately from non-contaminated garments.
- Never incinerate leaves or materials contaminated with urushiol—the oil becomes airborne and the smoke can cause very severe reactions.

Electrical Hazards

By the time the conservator is involved in responding to an emergency, all electrical hazards should have been eliminated. Particular situations may require improvements (including flickering or dimming lights, frequently interrupted power, and damaged wiring) that necessitate a licensed electrician.

- Be aware of the location of downed power-lines.
- Never enter water-flooded rooms unless you are certain that the electricity has been cut off.
- A plug-in Ground Fault Circuit Interrupter (GFCI) adaptor should always be used on any electrical circuit unless it is known to already be protected with a GFCI system and that system has been tested (red "test," black "reset" buttons). OSHA requires ground-fault circuit interrupters on all outlets used for power tools during repair and construction, and on all outlets within 10 feet of water.
- Never attach a generator directly to the electrical system of a building unless a qualified electrician has properly installed a transfer switch or unless you have obtained the approval of the electrical utility. Backfeed electricity can occur from generators and can be powerful enough to electrocute someone working on the lines.
- Fuel-powered generators should be positioned so that the exhaust can not be drawn into building or active work areas.
- Refueling a generator poses a fire hazard. Follow manufacturer's warnings and have a tri-class (A, B, C) fire extinguisher near by. Keep

fuel safely away from the generator while it is running.

- Use ear protection if working in close proximity to generator operation
- Carry and use a non-contact voltage detector to verify that dead circuits are truly dead and that live circuits are live.

Stability Hazards

Although the site may be declared safe for re-entry, be alert to any signs of instability, such as teetering shelving or objects that appear to be hanging without appropriate support.

- Leave immediately if shifting or unusual noise signals a possibility of collapse.

Confined Spaces

The interior of a storage vault, a basement, or any other space with limited means of exit or entry and a potentially impaired ventilation system is defined as a "confined space." Such spaces may lack oxygen, have accumulated toxic gases, or pose explosion hazards.

- Work in confined spaces is extremely hazardous and requires specialized training. See OSHA regulations for permit-required confined spaces for general industry (29 CFR 1910.146)
- Never entered a confined space unless someone who has received training in confined spaces has examined the space and determined that it is safe.
- Never attempt to rescue someone in a confined space who has become incapacitated unless you have received the appropriate training to carry out a rescue.

Fire Hazards

Fire detection and suppression systems may be rendered inoperable or diminished, and the potential for a fire event can increase during recovery. Emergency responders, such as the fire department, may have delayed or minimal response to incidents because of concurrent demands. Fire alarm systems may be operating on battery power that may have limited duration. These factors and basic code requirements necessitate that a full complement of portable fire extinguishers be available throughout the facility in accordance with

NFPA 10—*Portable Fire Extinguishers*. Ensure that they are properly inspected, tested, and maintained in accordance with the code before any work proceeds.

- If a fire protection system is impaired, ensure that proper interim compensatory safety measures are instituted, such as a fire watch, etc.
- If the fire protection systems are out of service, ensure that notification is made to the local authority having jurisdiction, insurance company, and other appropriate parties as applicable.
- If damaged or a hazard, ensure that all facility utilities are secured as appropriate. This may include the electric, gas, propane, water, etc.
- If emergency lighting is provided throughout the facility, it will likely have limited duration unless supported by an electric generator. After approximately 1.5 hours, other sources of portable lighting such as flashlights will become necessary. NEVER use open flames such as candles or lanterns.
- If hazardous situations, such as unsecured chemicals, damaged containers, tanks, or drums are encountered, immediately leave the area and report the hazard to the local authorities such as the fire department.
- Fuel-burning equipment should not be introduced into a facility if at all possible. This may include but is not limited to generators, gas grills, and heaters—all of which can create a fire hazard, as well as a significant risk for carbon monoxide exposure. Such equipment must only be used a safe distance from the facility, never near any intake location such as a vent, open window, or door. Never use the equipment in a confined or poorly ventilated location.
- Include the local fire department in all stages of pre-planning for emergency response to ensure they are familiar with your facility, the special hazards, etc.

Collection Hazards

Hazardous chemical exposures can occur from museum or heritage collections, laboratories used for conservation, chemistry or exhibit preparation work,

Table 2. Possible Hazards

HAZARD	EXAMPLES OF SOURCES	PATHWAY/DANGER	PRECAUTION
Acids & Bases			
Acids and Bases	Found in laboratories; cleaning, plumbing & other maintenance supplies; batteries	Contact, inhalation (ammonia)	Nitrile gloves; un-vented goggles; respirator with acid gas/organic vapor or with ammonia multi gas/vapor cartridge; can neutralize
Biological Agents			
Bacteria, viruses, fungi (mold), parasites	Soil, air water, contaminated by human remains, sewage, recently dead animals; frozen specimens or tissues; some fluid-preserved anatomy specimens; live animals that serve as disease vectors (deer, mice); sites of infestations by mice, bats, birds, fungi; rotting foodstuffs, damp or wet objects	Inhalation, ingestion via open wound or improper sanitary precautions, contact with contaminated materials (wet or dry). Relatively mild, allergic reactions to serious medical conditions, even death (www.osha.gov select B at site index).	P-100 filtering face piece, impermeable gloves, bag specimens or suspected source, before they defrost or affect you, if possible. For mice or animal fecal material, spray with a solution of bleach in water wearing mask and gloves, area can safely cleaned up later.
Compressed Gases			
Compressed gas tanks	laboratories, welding shops, hospitals	Explosion or asphyxiation.	Use strapping to constrain; use soap solution to check for leaks; check valves for damage
Drugs/Poisons/Controlled Substances			
Curare and other arrow poisons, many herbs and seeds, many old pharmaceuticals, including hallucinogens and concentrated forms of drugs	Anthropology, botany, ethnobotany & collections; medical & science/technology collections	Contact with skin penetration, liquids and powders may pose inhalation hazards	HEPA filtering respirator; impermeable gloves; goggles; spill booms, pillows or powders
Explosives			
Black powder, ammunition, picric acid, anhydrous ethyl ether, nitrite salts, land mines, grenades (also including picric acid)	Fertilizers, court records, gun collections, laboratories, war museums; field collecting equipment	Explosion	Explosives are in the same category as agents of chemical warfare; evacuate and contact a firearms expert, or bomb expert; if picric acid is present, do not touch, seek help immediately
Formaldehyde			
Formaldehyde (dust), Formalin (liquid, a solution of formaldehyde gas in water)	Fixitive for fluid-preserved biological specimens in natural history collections; adhesive in wood composites (urea formaldehyde) and acoustic insulation	Inhalation or contact	Respirator with multi gas/vapor cartridge + HEPA if dust; nitrile or laminated film gloves; un-vented goggles; appropriate spill kits
Live Vertebrates & Invertebrates			
Toxins from venomous species	Insect stings, animal or snake bites, ticks; snakes and any injured or displaced animals may be aggressive in disaster situations	Internal; rabies may be contacted via contact with saliva of infected animals; any tick infested with Lyme disease left on human skin for more than 24 hrs. can cause illness	Use appropriate repellent; if allergic carry antidote; wear appropriate clothing (high boots for fields, high rubber for water, chaps for legs); for insects: watch for infection, inspect daily for ticks; for snakes: bites, physiognomic details will help with ID, keep spot where bitten below heart and seek medical help; for all animals bites, seek medical attention immediately
Metals/Metal Salts			
Chromium, cobalt, nickel and mercury metals or salts, lead	Metal plating; mercury amalgams; conservation treatments; some scientific and technical equipment; batteries; house paints, pewter, glass, solder; mineralogy collections; thermometers, manometers; laboratories with old vacuum shutoff valves and gauges, fluorescent light tubes	Ingestion or inhalation (dusts, mercury vapor); some chromium compounds are human carcinogens	HEPA filtered respirator, with mercury vapor cartridges for any form of inorganic mercury; impermeable gloves; goggle; disposable clothing or impermeable suit & booties; seek professional remediation if there are liquids present or if lead paint is friable or burned on a large scale
PCB's and other Toxins			
PCB's	Transformers, by-products of burning, chlorine bleaching of paper. Note: microscope slides were often prepared with Aroclor.	High concentration can lead to chloracne, a painful skin condition.	Impermeable gloves, and if handling the liquid, protective clothing (safety goggles, respirator and impermeable clothes)
Radioactive Materials			
Radium (produces radon gas) spent uranium oxides, radioactive isotopes, polonium and other decay products	Radium-sold in early 1900s to promote health, used as sunsight illuminator, watchface; missile warheads; notebooks from labs working with radioactive materials; medical & technology collections; some fossils and minerals; some glassware & ceramics	Hazardous via any route	Professional remediation and clean-up necessary
Residual Pesticides/Fungicides			
Inorganic (arsenic, mercury, & talc or silica used as carriers), organophosphates (ex: dichorvos) organochlorines (ex: DDT or chlordane), botanicals (pyrethrins, strychnine), pyrethroid (ex: permethrin), creosote (coal tar)	Residues from past pest control or fungal control treatments on or in objects & building materials	Inhalation (dusts, mercury vapor), skin contact; arsenic, creosote, and silica are human carcinogens	HEPA filtered respirator, with mercury vapor cartridges for any inorganic mercury salts; nitrile gloves; goggles; disposable clothing or impermeable suit & booties; destroy clothing if contaminated with carcinogens
Solvents			
Distilled hydrocarbons such as gasoline, kerosene, benzine, mineral spirits, alcohol, ethylene glycol, carbon tetrachloride	Found in cleaners; inks; paints; early fire extinguishers; dry cleaning agents; conservation, exhibition, photography, & chemical labs; as storage medium for some biological specimens, carriers for aerosols	Inhalation and contact, flammability	Glove choice will depend upon chemical ID; un-vented goggles; respirator with organic vapor cartridges; spill booms, pillows or powders;

For more detail concerning these and other hazards see: "Collection-based hazards: the dark side of collections" by C. Hawks and K. Makos in *Postprints of the AIC Conservators in Private Practice Health and Safety Session, AIC Annual Meeting, Dallas, TX, 2 June 2001*. <http://aic.stanford.edu/sg/cipp/postprints2001.html>

building components, or the surrounding environment. Table 2 includes a list of potential hazards by chemical class, with an indication of appropriate PPE. Consultation with a HAZMAT team and protecting yourself from inhalation, absorption, or skin contact is crucial.

Do not contaminate the rest of your clothing or your household with soiled garments. The use of disposable clothing, lab coats, aprons, and other garments can protect your personal clothing. When in doubt, discard.

Debriefing

Responding to an emergency is stressful even when we do our best to take care of ourselves. Research has suggested that during times of extreme stress, one works at only about 20% of

normal capacity. It is not uncommon for individuals involved in an emergency to experience the stages of grief as described by Kubler-Ross—denial, anger, bargaining, depression, and acceptance. They may feel as if everything they did was wrong, and that everything was their fault. Behaviors may vary from the “traditional” instinctive responses of freeze, fight, or flight to the more recently observed “mend and befriend.”

Once the emergency has been brought under control, it is important that all participants meet to document the incident as well as their response to it.

- Gather complete and accurate information about the incident.
- Assess successful aspects of the response, and specific areas of

response that could benefit from improvement.

- Help address stress by allowing participants to “unburden” and share their personal reactions to the event.

Conclusion

In emergency response, always put your own safety and that of others first, otherwise, you put the entire response effort at risk. Each time we participate in a response, we gain greater insight into those accumulated best practices that promise to improve both our personal skills and make lasting contributions to our knowledge of emergency response.

Incident Report

An activity log is useful to outline the event's chronology. Elements will include information provided by:

Time

Individual relating data

Communication mode: (PA system, radio, telephone, in-person):

Type of incident

Activity Log data

Who witnessed or discovered problem

Who was notified

Actions taken to address event (in what order and by whom: internal/external personnel)

Describe relevant conditions: (examples below)

Weather

Building conditions

Equipment involved

Human elements

Warnings

Personnel record

Individuals involved: (including names, addresses and phone numbers of all staff, volunteers, and external assistance)

Actions/activities:

Time Spent:

Injuries/illness related to the incident:

Explore “human factor” (emotional response, adequate rest and sustenance, understanding of what transpired)

Actions required after incident

Building stabilization

Response and recovery efforts

Outcome of the event

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