



Chemical Terrorism and Chemical Emergencies

Chemicals play important roles in our everyday lives. They are found in a wide range of household and commercial products that can be lifesaving as well as hazardous to our health. Accidents do happen. In addition, we must confront the threat of terrorist activity that includes the use of chemicals as weapons. Chemical events can have serious implications for human health and the environment. Preparing for and responding to chemical emergencies and chemical terrorism are important functions of public health.

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What is a chemical emergency?

Chemical emergencies are accidental releases that may be as simple as spilling a household chemical, causing minimal damage, or as complex as an industrial chemical release, causing significant damage to human health and to the environment.

One of the worst accidental chemical releases happened twenty years ago when a plume of methyl isocyanate was released from a plant in Bhopal, India, causing tens of thousands of deaths and injuries in the surrounding community.

What is chemical terrorism?

Chemical terrorism is the intentional use of chemicals as weapons for the purpose of causing significant social and economic disruption as well as damage to human health and to the environment. As an example, a religious cult released the nerve agent sarin into the Tokyo subway system in 1995. This incident caused major panic and social disruption despite relatively few deaths and injuries.

What are the health effects from a chemical exposure?

Exposures to hazardous chemicals can cause a wide range of adverse health effects depending on the nature of the chemicals used, a person's susceptibility, routes of exposure (breathing, eating, or through skin absorption), and a number of other factors. Both short and long-term health effects are possible from chemical exposures.

What are the signs of a chemical release?

Harmful chemical exposures are usually characterized by the rapid onset of medical symptoms (minutes to hours) and easily observed signs, found in the table below.

Some important points to remember about hazardous chemicals:

- The fading of a chemical odor does not necessarily indicate a reduced amount of the chemical in the area - your sense of smell may have become dulled to the odor.
- Signs and symptoms depend on the amount and type of chemical exposure and the duration of exposure.
- Animals, children, pregnant women, the immunocompromised, and the elderly may experience adverse health effects more quickly and at lower exposure levels than healthy adults.

The following signs could suggest a chemical release:

In humans, look for:	In the environment, look for:
Unusual numbers of sick people or deaths, (mass casualties). Health problems can include nausea, disorientation, difficulty in breathing, sweating, skin and eye irritation, convulsions and cardiac arrest.	Unusual numbers of sick or dead animals, birds, or fish. Near water, check for but do not touch dead fish, birds or other aquatic life.
Blisters/rashes Numerous individuals will experience unexplained water-like blisters, welts (like bee stings), and/or rashes.	Lack of insect life Normal insect activity (ground, air, and/or water) is missing. Unusual numbers of dead insects are found on the ground/water surface/shore line.
Pattern of victims Outdoors, the injured or dead are likely to be distributed downwind from the release. Indoors, air ventilation systems will distribute chemicals.	Unexplained odors Smells may range from fruity to flowery to sharp/pungent to garlic/ horseradish-like to bitter almonds/peach kernels to new-mown hay. Note: The odor is completely out of character with its surroundings. Some odors may not be noticeable to the entire population.
Illness in a localized area More people than normal will be ill, either indoors or outdoors, depending where the agent was released.	Different looking areas, unusual metal debris, liquid droplets, abandoned spray devices, low lying clouds Be aware of trees, shrubs, bushes, food crops, and/or lawns that are dead, discolored, or withered; brown, yellow, amber, greenish-yellow or colorless spills; unexplained bomb-like material; oily droplets/film; fog-like conditions not consistent with their surroundings. Do not touch these areas/devices.

Are there some chemicals of particular concern because of terrorism?

There are certain chemicals that are of particular concern because they are extremely toxic. Some have been used in warfare (including mustard gas in World War I) and some are of concern because they are toxic materials widely used in industry. Many countries have signed treaties agreeing to disband their stockpiles of chemical weapons. However, terrorists may still have access to these chemicals or the technology to make them.

The major classes of chemical terrorism agents and their health effects are listed below.

Class of Chemical Agent	Odor and/or Color	Early Recognition or Signs & Symptoms	Harmful Health Effects
<p>Nerve Agents Organophosphate pesticides (malathion), tabun, soman, VX, sarin</p> <p>Onset of symptoms: Vapor: seconds Liquid: minutes to hours</p>	<p>No odor, fruit or camphor odor. Colorless, amber, or brown liquid.</p>	<p>Small pupils, blurred vision, excessive tears, sweating, twitching, shortness of breath, chest tightness, abdominal cramps, nausea, vomiting, diarrhea, seizures, loss of consciousness, respiratory failure, arrhythmia, ataxia.</p>	<p>Chemicals are unstable at normal temperatures; readily absorbed through eyes, lungs, skin.</p>
<p>Blood Agents Cyanide, cyanogen chloride, hydrogen cyanide</p> <p>Onset of symptoms: seconds to minutes</p>	<p>Bitter almond, mild garlic, or odorless; colorless gas or liquid.</p>	<p>Headaches, gasping for air, dizziness, loss of consciousness, high/low heartbeat, respiratory/cardiac arrest, nausea, vomiting, headache, drowsiness, hallucinations, seizures. Cyanogen chloride may cause burning in eyes, the respiratory tract, or skin.</p>	<p>Absorbed through inhalation. Rapid acting agents that interfere with oxygen utilization; multiple organ system failure.</p>
<p>Blister Agents Sulfur mustards, nitrogen mustards, lewisite, phosgene oxime</p> <p>Onset of symptoms: Lewisite: seconds to minutes</p> <p>Sulphur Mustards: hours</p> <p>Phosgene oxime: seconds</p>	<p>A variety of odors including garlic, fishy, soapy, fruity, or no odor; colorless to dark liquid. Lewisite: geranium. Sulphur Mustards: garlic, mustard.</p>	<p>Some cause immediate pain with blisters later; red skin, severe itching/ burning, chemical burns; nose, throat; lung irritation to noticeable airway damage; dry cough, nosebleeds; nausea, vomiting, diarrhea, convulsions.</p>	<p>Absorbed through eyes, lungs, and skin; blisters on skin and damage to eyes, mucous membranes, respiratory tract, internal organs; multiple organ system failure.</p>

<p>Tear Agents Chloropicrin, tear gas, mace</p> <p>Onset of symptoms: seconds</p>	<p>Various odors including apple blossoms, chloroform, flypaper, benzene, soured fruit, pepper; yellow or colorless solid or liquid.</p>	<p>Eye, nose, throat, respiratory tract irritation, tearing, coughing, vomiting, pulmonary edema.</p>	<p>Burning, stinging of eyes, nose, airways, skin.</p>
<p>Choking Agents Phosgene, chlorine, methylisocyanate, ammonia</p> <p>Onset of symptoms: immediate</p>	<p>Phosgene: new-mown hay, irritating odor, colorless gas. Chlorine: greenish-yellow gas, irritating odor. Ammonia: colorless, highly irritating gas with pungent, suffocating odor.</p>	<p>Irritating and corrosive to eyes, skin, respiratory tract and other mucous membranes, nausea/vomiting; shortness of breath, rapid breathing, coughing, wheezing, rattles, coughing up blood, upper airway swelling, lung collapse; fast heartbeat, possible cardiovascular collapse.</p>	<p>Rapidly absorbed agents that damage the respiratory tract and cause severe pulmonary edema; ammonia and chlorine liquids can cause frostbite.</p>
<p>Toxins Botulinum, ricin</p> <p>Onset of symptoms: hours</p>	<p>Varies, generally odorless and tasteless.</p>	<p>Botulinum causes progressive paralysis, droopy eyelids, difficulty swallowing. Ricin inhalation may cause flu-like symptoms. Ricin ingestion may lead to vomiting, abdominal pain.</p>	<p>Diverse toxic effects from incapacitation to death; damages tissues, disrupts brain and nervous system function.</p>

What systems are in place to respond to chemical incidents?

Every county has an emergency response plan and a system for contacting emergency responders. First responders include specially trained hazardous materials (HAZMAT) teams, fire fighters, police, and emergency medical technicians. They control access to the affected area, try to prevent the spread of contaminants, find and treat the injured, and collect criminal evidence. First responders are trained to recognize chemical hazards and use appropriate protective equipment including respiratory protection devices and protective clothing.

Generally, public health staff are not "first responders". Public health staff assess short and long-term impacts of the event on human health, food, water, and sanitation and order actions to protect the public from chemical contamination. Public health staff work with local hospitals and health care providers to assure essential medical services.

They may also interview victims or provide backup to first responders and medical staff. State and federal public health agencies become involved if the event is larger than can be handled with local resources.

How can you prepare for chemical emergencies?

- Learn about risk from household chemicals. Contact the Michigan Department of Community Health, 1-800-MI-TOXIC, or go to the National Institutes of Health website, <http://householdproducts.nlm.nih.gov/products.htm>.
- Learn about your community's risk from chemical hazards by contacting your county's emergency manager or Local Emergency Planning Committee, LEPC.
- Become familiar with your community's emergency warning systems.
- Learn how to 'Shelter In Place' by visiting the American Red Cross website, <http://www.redcross.org/www-files/Documents/pdf/Preparedness/shelterinplace.pdf>
- Learn how to prepare a Family Disaster Plan by visiting the American Red Cross website, http://www.redcross.org/preparedness/FinRecovery/FinPlan/pdfs/aicpa_ch1.pdf.
- Learn how to talk to your kids about preparing for emergencies by visiting the Federal Emergency Management Agency, FEMA, website, <http://www.fema.gov/kids/>
- Take a first aid/CPR course.

What should you do if a chemical incident occurs?

Remember to stay calm! Your first priority is your safety and the safety of those around you.

In case of a home emergency:

- Call 911 and/or Poison Control Center, 1-800-222-1222.
- Have chemical containers available to provide details about the chemical(s).
- If chemical has come in contact with the eyes, flush eyes with clean water for 10-15 minutes or as directed.
- If help is not available, decontaminate yourself:
- Remove all clothing or other items in contact with your body.
- Cut clothing off. Do not pull over your head.
- Gently wash exposed parts of your body with soapy water and rinse thoroughly.
- Change into clean clothing that has not been exposed to the contamination.
- Place removed clothing in a bag and seal tightly to prevent chemical vapors from escaping. Put the bag inside another bag, seal tightly and place in an area unlikely to cause further human or animal exposure. Ask professionals for disposal instructions.
- Minimize exposure time between you and the chemical.
- If potential of fire or explosion exists, get out of the house immediately.

In a major chemical emergency:

- Listen to your radio or television for instructions from emergency response authorities. The Emergency Alert System may be activated. If so, you will be given instructions on what to do.
- Follow the instructions from the authorities. Your life may depend on it!
- Do not call 911 unless faced with a life-threatening emergency. Communication systems must be accessible for emergency calls.
- Remain upwind, uphill and upstream of the chemical release.
- If you are the first to discover the scene of a chemical release, call 911 immediately!!! If possible, provide the following information:
 - Telephone number for callbacks at the scene
 - Local officials that have been notified of incident; fire, police
 - Specific date, time and exact location of the incident
 - Materials and quantity involved in incident
 - Responsible party, if known
 - What kind of assistance is requested

- What has happened or what is happening

Who should you call if a chemical incident occurs?

Type of Incident	Agency	Emergency (notify immediately!)	Non-Emergency
Poisoning Emergency	Poison Control Center	1-800-222-1222	1-800-222-1222
Chemical Release	Local Fire Department	911	
	Your Local Health Department	Find at www.malph.org	Find at www.malph.org
Actual or Threatened Chemical Terrorist Event	Local Law Enforcement	911	
	Michigan Department of Community Health, MDCH	1-517-335-9030	
Environmental Emergency (chemical spill/release)	Michigan Department of Environmental Quality, (DEQ)	1-800-292-4706	1-800-662-9278

For more information, visit the following websites:

Michigan Department of Community Health Office of Public Health Preparedness:

<http://www.michigan.gov/ophp>

Michigan Department of Community Health: <http://www.Michigan.gov/mdch-toxic>

Michigan Department of Environmental Quality: <http://www.michigan.gov/degrelease>

Centers for Disease Control and Prevention: <http://www.bt.cdc.gov/Agent/AgentlistChem.asp>

FEMA, Emergency Management Guide for Business and Industry:

<http://www.fema.gov/library/bizindex.shtm>

Sources:

The Minnesota Department of Health, Environmental Health Division

Federal Emergency Management Agency, FEMA

U.S. Department of Transportation 2000 Emergency Response Guidebook