Chemical Release Toolkit

A planning guide for health, climate, and emergency response professionals

Wisconsin Climate and Health Program and Site Evaluation Program

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Introduction

Purpose

The purpose of this toolkit is to provide information to local governments, health departments, and citizens in Wisconsin about preparing for and responding to chemical spills. The toolkit provides background information, practical guidance, strategies, media releases, talking points, definitions, and useful reference materials on this topic.

The guides in this toolkit may be copied onto your agency letterhead for distribution to residents and visitors affected by chemical releases in your locality. Additional resources may be found at the end of this document.

Background

Chemical release events impact workers, first responders, and the public every year in the United States. The chemicals highlighted in this toolkit are among the most commonly released in industrial and transportation settings nation-wide, but they are also found where you live, learn, work, and play. A chemical spill can happen at any time, so it's important to be prepared and know what to do when one occurs to keep yourself and your community safe.[1] Chemical spills can occur during chemical production, storage, transportation, or disposal. Extreme weather events and natural disasters like flooding, tornadoes, and wildfires can damage infrastructure and cause dangerous chemical spills.

Climate Trends

According to the National Climatic Data Center, in 2023 the United States experienced 28 separate weather and climate disasters costing at least 1 billion dollars each, five of which happened in Wiscosnin.[2] That same year, Wisconsin experienced ping pong weather, cycling between record rain fall and nearly record dry months.[3] Wisconsin Initiative on Climate Change Impacts (WICCI) climate scientists expect that precipitation in Wisconsin will continue to increase into the mid-century (see Figure 1). According to WICCI scientists, changing climate patterns will place stress on the built environment: "Our rural roads, highways, airports, ports, dams, stormwater and wastewater systems have been designed according to past climate conditions that do not account for changes in climate, including increasing precipitation, earlier spring thaws and more freeze/thaw cycles, higher water table elevations, and more humid heat waves."[4] Around 2-5% of chemical releases in the US are a result of weather related phenomena. With anticipated increases in precipitation events and winter storms, Wisconsin residents should become educated on chemical spills, as they are likely to increase in occurrence.

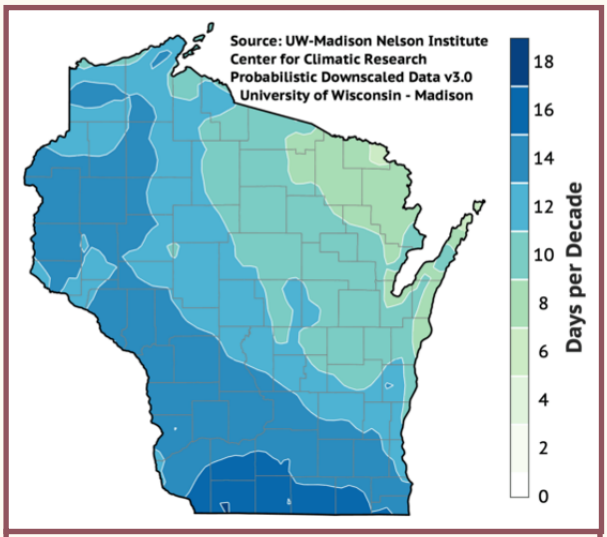


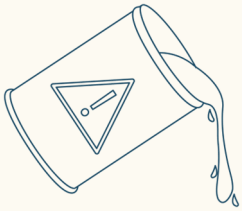
Fig. 1 - By 2060 Wisconsin will experience more days with greater than 2in of rain.

Health impacts

Spills can result in acute exposure to high concentrations of toxic chemicals and a wide range of harmful health impacts. Many chemicals can be irritating to any exposed tissues (for example, skin, eyes, respiratory tract, and digestive tract). Other chemicals can cause neurological effects, such as dizziness, confusion, headaches, nausea, and vomiting. Because acute chemical exposures can lead to severe injury or death, it is essential to become educated on the storage and transport of chemicals in your community, and to work closely with other local, state, and private partners to develop and regularly test emergency response plans in an effort to minimize human harm.[5,6]

Chemical spill response and recovery guidance

Under the Wisconsin "Home Rule" principle, chemical spill preparedness and response are considered local activities. The local or county emergency management office, health agency, or police/fire first responders will be the lead agency during a chemical spill. However, when requested, state resources will be provided to assist and support the local response.



Whom to contact during a chemical release

When in doubt, always report a chemical release to the Wisconsin Department of Natural Resources. Immediately seek medical attention in the event of a chemical release, even if injuries are not immediately apparent.

Wisconsin DNR
Toll-free hotline for chemical spill assistance: (800) 943-0003

Poison Control Center
If you have been in contact with a harmful chemical, call 800-222-1222.

Animal Poison Control Center
If livestock or a pet has been in contact with a harmful chemical, call 888-426-4435.

Environmental Protection Agency (EPA)
Region 5 Response Center: 312-353-2318

Wisconsin Department of Health Services (DHS) 24/7 Emergency Hotline
DHS can provide advice or assistance for emergencies that involve public health and human services concerns, including chemical incidents and spills: 1-800-943-0003 (option 4).

Definitions

Biotoxins
Poisons that come from biological sources (for example, nicotine).

Blister agents/Vesicants
Chemicals that severely blister the eyes, respiratory tract, and skin on contact (for example, mustard gas).

Blood agents
Chemicals that affect the body by being absorbed into the blood (for example, carbon monoxide).

Caustics
Chemicals that burn people's skin, eyes, and mucous membranes on contact (for example, hydrogen chloride).

Chemical emergency
An intentional or unintentional release of a chemical into the environment that can cause harm to a person's health.

Choking/Lung/Pulmonary agents
Chemicals that cause severe irritation or swelling of the respiratory tract (for example, ammonia).

Hazardous substance
Any chemical agent released into air, soil, or water that causes harm to people or the environment.

Incapacitating agents
Chemicals that make people think unclearly or cause an altered state of consciousness (for example, opioids).

Long-acting anticoagulants
Chemicals that prevent the proper clotting of blood, which can lead to uncontrollable bleeding (for example, superwarfarin).

Metals
Agents that consist of metallic poisonings (for example, mercury).

Nerve agents
Chemicals that prevent the nervous system from working properly (for example, sarin).

Organic solvents
Agents that damage tissues by dissolving fats and oils (for example, benzene).

Vomiting agents
Chemicals that cause nausea and vomiting (for example, adamsite).

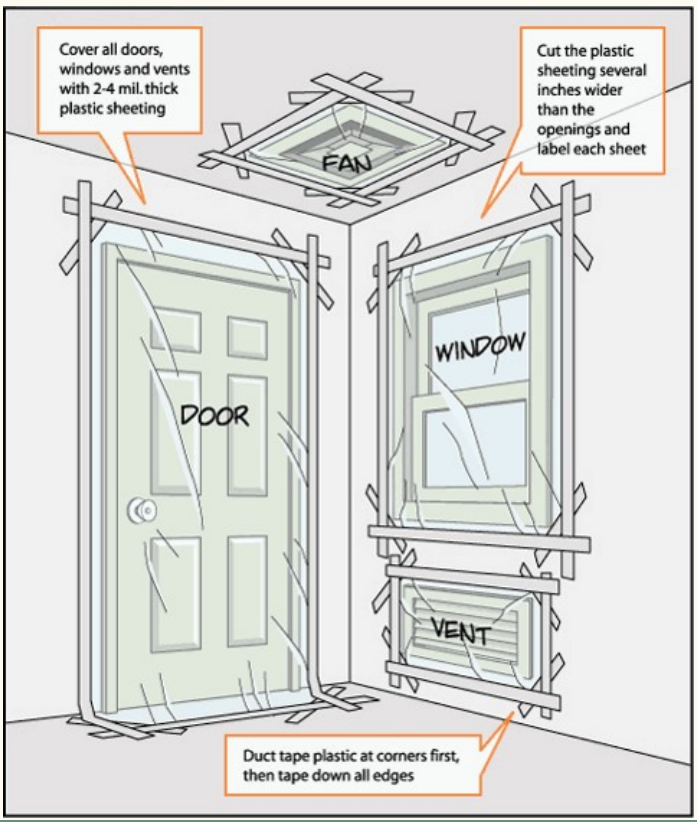
Chemical release preparedness

"Sheltering in place" is an emergency response practice in which your current, indoor location becomes your shelter.[7] Expect a "shelter in place" order when there is a "code red" or "severe" terror alert. Listen to the radio and television for orders to shelter in place during an emergency. Pay attention to local officials for appropriate guidance, as every emergency situation is different.

What to do when a shelter in place order is announced

Go inside immediately, taking any pets with you, and follow these steps to ensure your safety:

- Shut and lock all windows and doors.
- Turn off the furnace, air conditioner, and fans.
- Close fire damper and any other openings where outside air can get in.
- Pick the highest room inside the building with as few windows and doors as possible. This room will preferably have a water supply.
- Turn on the radio and listen for updates.
- Place plastic over any windows and doors in the shelter room and seal with duct tape (see picture to below).
- Tape over any vents, electrical outlets, or other openings in the shelter room
    - If you do not have plastic sheeting at your home, be prepared to use other household items to help seal gaps in your shelter room.



- If you're at home, bring the following into your shelter room:
    - First aid kit.
    - Flashlight, battery-operated radio, extra batteries.
    - Telephone.
    - Food and bottled water.
        - One gallon of water per person (do not drink from the tap).
        - Packaged foods that do not require preparation or refrigeration.
    - Duct tape, scissors, plastic sheeting
- Shut the door.
- Do not go outside until local officials advise you it is safe.

Evacuation due to a chemical release

Government and local officials will notify you if an evacuation is ordered. Listen closely to the radio and television.[9]

If an evacuation is ordered:

- Leave immediately for a shelter and follow the evacuation route determined by emergency officials.
- Bring a disaster emergency kit. Most supplies will be provided at the shelter.
- If your children are at school, do not pick them up unless notified to do so.
- Notify a relative or friend in another state of your plans and location, as local phone lines may be busy.
- If you do not have a means of transportation, secure transportation to a shelter prior to an emergency.

Assemble a disaster emergency kit [10]

- ☐ Three day supply of water (one gallon of water per person, per day)
- ☐ Three day supply of non-perishable food (and can opener)
- ☐ Battery-operated radio and extra batteries
- ☐ Cell phone and charger
- ☐ Flashlight and batteries
- ☐ First aid kit (bandages, gauze, tweezers, disinfectant, gloves, pain relievers, thermometer, etc.)
- ☐ Whistle to signal for help
- ☐ Dust mask
- ☐ Survival blanket (also known as a space blanket)
- ☐ Extra, physical cash (about $50-$100)
- ☐ Pocket knife
- ☐ Wrench to turn off utilities
- ☐ Medications, hand sanitizer, moist towelettes, plastic ties, and garbage bags
- ☐ Local maps for evacuation
- ☐ Change of clothes (for example, a rain jacket, gloves, hat)

What to do if you are outside during a chemical release

In a vehicle

- Find the nearest building and go inside. Cover your mouth and nose with a cloth while traveling from your car to the building.[11]
- If there are no buildings around, close windows and vents and shut off the air conditioner and heater.

In the open

- Stay upstream, uphill, and upwind.
- Stay at least one-half mile from the location of release.
- Avoid all contact with gases, fumes, vapors, liquids, and solids that could be contaminated.
- Avoid contaminated victims until contamination source has been identified.

How to dispose of contaminated clothing

- Quickly remove clothing that has come into direct contact with a chemical. Cut off clothing rather than pulling it over your head.[12]
- Put clothes into a plastic bag, while avoiding contaminated areas of the clothing. Use tongs or other appliances to handle contaminated clothing.
- Any appliance used to dispose of clothing should also be placed inside the plastic bag. Seal the first plastic bag inside a second plastic bag.
- Alert local officials of your “contamination bag” for proper disposal.

Common chemical release information

Ammonia

Ammonia, also known as anhydrous ammonia, dissolves in water and is found in air, soil, and water at low levels. At higher levels, it is an irritant. At very high levels, it can be deadly. It is widely used in manufacturing and industrial productions and is often found in residential settings in household cleaners. Visit ATSDR's ToxFAQs for more information on ammonia.

Chemical facts

- Colorless, odorous gas
- Human-made and naturally occurring

Exposure

- Ammonia can be found in fertilizer, industrial refrigerant, household and industrial cleaners, and decaying manure.
- Exposure can result from:
  - Breathing in ammonia from transportation or storage leaks
  - Over-exposure to fertilizer
  - Swallowing, breathing in, or skin contact from cleaning solutions

Health effects and action steps

Ammonia can enter your body through contact with your skin and eyes, breathing in the chemical, or swallowing it. How the chemical affects your health depends on how it enters your body. Follow the specific action steps below if you are exposed to ammonia.[13] Repeated exposure to ammonia has been shown to result in asthma-like symptoms and lung damage.[14, 15]

Route of entry into the body	Health effects	Specific action steps
Contact with the eyes	Irritation and burning	Rinse eyes with lukewarm water for 15 minutes.
Contact with the skin	Irritation and burning	Thoroughly wash exposed skin with soap and water.
Breathing in	Irritation, burning, swelling and tightening of the airways	Move to fresh air and seek medical attention.
Swallowing	Nausea, vomiting, and irritation and burning of the mouth, throat, and stomach	Do not make yourself throw up. Drink water or milk to water down the chemical in your body and seek medical attention.

Regulations

According to the U.S. Environmental Protection Agency (EPA), ammonia spills that are 100 pounds or more must be reported.

Natural Gas

Natural gas is used in residential settings and industrial processes. Natural gas pipelines are located underground. Call the free Digger's Hotline at 811 before renovating or digging to prevent an emergency natural gas leak from punctured pipelines. Visit the American Public Gas Association for more information on natural gas safety.

Chemical facts

- Colorless, nontoxic gas
- Rotten egg odorant is added to natural gas before distribution by gas companies for easier detection of leaks.[16]

Exposure

- Natural gas is used as an energy source for heating, cooking, and electricity generation. It is distributed by gas companies via underground pipelines.
- Natural gas leaks can result from damaged pipelines. Pipelines can be damaged by:
  - Extreme weather events like tornadoes, hurricanes, and extreme cold
  - Digging and puncturing
  - Buildup of snow and ice on gas meters, pipes, and appliances
  - Collapsed buildings
  - Fire or explosion near the pipeline
  - Under- or overpressure in the pipeline
  - Heavy loading over buried sites

Health effects

Fire or explosion	**Suffocation**: Natural gas replaces oxygen in the air and can lead to asphyxiation.	**Carbon monoxide (CO) poisoning:** CO is a byproduct of burning natural gas. Burning natural gas in an enclosed space with no ventilation may cause carbon monoxide poisoning. Symptoms include nausea, headache, dizziness, blurred vision, difficulty breathing, confusion, and unconsciousness.[17] Visit ATSDR's ToxFAQs for more information on carbon monoxide.

Hydrochloric acid

Hydrochloric acid, also known as aqueous hydrogen chloride and muriatic acid, forms when hydrogen chloride makes contact with water. At room temperature, hydrochloric acid is a gas, called hydrogen chloride.[18] Visit ATSDR's ToxFAQs for more information on hydrogen chloride.

Chemical facts

- Odorous, nonflammable liquid
- Highly acidic solution

Exposure

- Hydrochloric acid is used in the production of chlorides, fertilizers, and dyes. It's also used in photographic, textile, and rubber industries. Laboratories use it as a solvent and catalyst.
- Exposure can result from:
  - Occupational exposure during production or use
  - Industrial or transportation leak
  - Improper use in swimming pools
  - Improper use as a disinfectant

Health effects and action steps

Hydrochloric acid can enter your body through contact with your skin and eyes, breathing in the chemical, or swallowing it. How the chemical affects your health depends on how it enters your body. Follow the specific action steps below if you are exposed to hydrochloric acid.[18,19,20]

Route of entry into the body	Health effects	Specific action steps
Contact with the eyes	Irritation and burning	Rinse eyes with lukewarm water for 15 minutes.
Contact with the skin	Irritation and burning	Wash exposed skin with soap and water for 15 minutes.
Breathing in	Coughing, choking, and burning of the throat	Move to fresh air and seek medical attention.
Swallowing	Nausea, vomiting, diarrhea, and burning and scarring along the digestive tract (mouth, esophagus, and stomach)	Do not make yourself throw up. Drink water or milk to water down the chemical in your body and seek medical attention.

Regulations

According to the EPA, hydrochloric acid spills of 5,000 pounds or more must be reported.

Chlorine

Chlorine, a bleaching agent, dissolves in water and is not often naturally found in the environment. It is widely used in manufacturing and industrial productions and is often found in residential settings in household cleaners. Visit ATSDR's ToxFAQs for more information on chlorine.

Chemical facts

- Odorous, greenish-yellow gas at room temperature
- Heavier than air and will occupy poorly ventilated areas.[21]

Exposure

- Chlorine is used in disinfectants, water purification, bleach, and treatment of sewage.
- Exposure can result from:
  - Industrial or transportation leak
  - Mixing certain household chemicals like toilet cleaners (those that contain acid or ammonia) with bleach, which can create chlorine gas
  - Improper use in swimming pools
  - Occupational exposure during production or use

Health effects and action steps

Chlorine can enter your body through contact with your skin and eyes and breathing in the chemical. Chlorine is a gas at room temperature so the risk of swallowing the chemical is unlikely. How the chemical affects your health depends on how it enters your body. Follow the specific action steps below if you are exposed to chlorine.[22,23] Breathing in this chemical is the most common route of entry into your body. [24]

Route of entry into the body	Health effects	Specific action steps
Contact with the eyes	Burning, excessive blinking, involuntary eyelid closing, redness, and inflammation.	Rinse eyes with lukewarm water for 15 minutes.
Contact with the skin	Irritation and burning, pain, inflammation, and blisters. Frostbite or chemical burns if skin contacts liquid chlorine.	Wash exposed skin with soap and water for 15 minutes.
Breathing in	Irritation of the eyes, nose, and throat, difficulty breathing, bluish skin color, coughing, nausea, vomiting, wheezing and chest discomfort, narrowing of the airways, pneumonia, and possible lung collapse.	Move to fresh air and seek medical attention.

Regulations

According to the EPA, chlorine spills of 10 pounds or more must be reported.

Media relations

Talking points and message maps for chemical spill-related injuries and fatalities

Message mapping is one of the most important risk communication tools that public health agencies can employ. The goal of a message map is to convey important information in a concise, easy-to-understand, and credible manner.

General guidelines for completing a message map

- Stick to one to three key messages. Underlying concerns or specific questions can be highlighted in the messages.
- Keep key messages brief. The reader should spend less than 10 seconds per line.
- Develop messages that are easily understood by the target audience. Use a 5th- to 8th-grade readability level for communications with the general public.
- Place messages within a message set. The most important messages should occupy the first and last positions.
- Develop key messages that cite credible third parties.
- Use graphics and other visual aids to enhance key messages.
- Keep a positive tone. Messages should be solution-oriented and constructive.
- Avoid unnecessary uses of the words no, not, never, nothing, none.
- Plan for making messages accessible for people who don’t speak English as a first language or those who have visual impairments.

Sample message map

If the media approaches you regarding a chemical release in your jurisdiction, the following talking points may be used. Start with message A1 or A2, then follow the instructions within that box.

A1

"We were notified by the medical examiner/coroner about a fatality, possibly due to a chemical release. Our condolences go out to the family."

Go to message B1 or B2.

B1

"Out of respect for the family, we are unable to share any details ."

Go to message C.

B2

"On [insert date], a [biological sex] ["____ years old" or "between the ages of ___ and ___"] died during the chemical release."

Go to message C.

A2

"We have not been notified of any recent fatalities linked to the chemical release."

Go to message C.

C

Chemical releases can be hazardous and fatal. People should remain safe by:

1. Reporting chemical spills to local officials.
2. Listening to local officials for orders to shelter in place or evacuate.
3. Avoiding contamination zones and remaining upwind of any spills.
4. For more information, visit [insert relevant website].

Talking points for chemical release

Main message:

"Since [November/December/January/February], there have been chemical releases in Wisconsin. To help you and your loved ones stay safe…"

Three key messages	Supporting information: Three supporting messages for each key message
Message 1: "Shelter in place when ordered."	• When sheltering in place is ordered, it is safer to stay inside. If you are not in a building, immediately find the closest shelter and stay inside. • Prevent chemicals from entering your shelter in place location by sealing all vents, doors, and windows with plastic and tape. • Follow the news updates. Do not leave your location until authorities give the "okay."
Message 2: "Evacuate when ordered."	• If authorities order an evacuation, move quickly and follow recommended routes out of your community. • Have an emergency disaster kit in your home and car to ensure a speedy evacuation. • Form and practice an evacuation plan with your family.
Message 3: "Report chemical releases."	• If a chemical is released on your property or at work, call 911 or the Wisconsin Department of Natural Resources at 1-800-943-0003 for assistance. • If you come in contact with an unknown or hazardous chemical, remove clothing and shower[12], call a medical professional, and call the Wisconsin Poison Control at 1-800-222-1222. • Large chemical spills must also be reported to Environmental Protection Agency's Region 5 Response Center at 312-353-2318.

Resources

Wisconsin Department of Health Services (DHS)
608-258-0099

DHS Chemical Hazards A-Z Webpages
dhs.wisconsin.gov/chemical/hazards-list.htm

List of Wisconsin Tribal Health Directors
dhs.wisconsin.gov/lh-depts/contacts/tribal-health-directors.pdf

List of Wisconsin Local Health Departments
dhs.wisconsin.gov/lh-depts/counties.htm

Wisconsin Emergency Management
608-242-3232
ready.wi.gov

Centers for Disease Control and Prevention
emergency.cdc.gov/chemical/

Federal Emergency Management Agency
fema.gov

Spanish Language Portal
fema.gov/es/

Federal Environmental Protection Agency
epa.gov/emergency-response

Agency for Toxic Substances and Disease Registry
atsdr.cdc.gov

American Association of Poison Control Centers
aapcc.org

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